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STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RIGHTS

Sacramento, California.

April 30, 1925.

Chief of Division of Water Rights,
Department of Public Works,
State of California.

Dear Sir:

The accompanying report on the Water Supply and Use of Water from North Cow Creek and its Tributaries, in Shasta County, is respectfully submitted for your approval.

This report was prepared pursuant to the order of the Superior Court of the State of California, in and for the County of Shasta, entered April 25, 1923, transferring the case of Charles L. Lemm, et. al, vs. John Rutherford, et. al., to the Division of Water Rights of the Department of Public Works of the State of California, for investigation, as referee, under the provisions of Section 24 of the Water Commission Act. The purpose of the report is to present necessary data upon which to base the findings of the referee, which data were obtained from United States Geological Survey Water Supply Papers 298 and 361, and from a field investigation covering the period from June 4th to October 15th, inclusive, 1923.

The field investigation was conducted simultaneously with a similar investigation covering Oak Run Creek and its tributaries, by Mr. F. F. Burrows, an assistant hydraulic engineer of the Division of Water Rights, and included a study of the water supply and diversions from these stream systems, and also a transit and stadia survey of all ditches and irrigated lands.

A set of maps has been prepared from the data collected, consisting of thirty detail sheets on a scale of one inch to three hundred feet and of a general map covering the watersheds of both North Cow Creek and Oak Run Creek on a scale of two inches to one mile, and the same is herewith submitted as a part of this report.

Respectfully submitted,

_____

Hydraulic Engineer.

REPORT

On

WATER SUPPLY AND USE OF WATER

From

NORTH COW CREEK AND TRIBUTARIES

SHASTA COUNTY, CALIFORNIA.

INTRODUCTION

The matter of the determination of the relative rights of the various water users from North Cow Creek and its tributaries was brought before the Division of Water Rights of the Department of Public Works of the State of California by an order of the Superior Court of the State of California, in and for the County of Shasta, dated April 25, 1923, transferring the case of Charles L. Lemm, et. al., vs. John Rutherford, et. al., to said Division for investigation as referee, under authority contained in Section 24 of the Water Commission Act.

The above mentioned case was initiated in 1920, and before it was referred to the Division of Water Rights various unsuccessful attempts were made by the parties involved to work out a settlement among themselves.

The eight plaintiffs are all lower riparian owners seeking to quiet title to their water rights, and twenty-six of the upper users from the stream system were named as defendants in the original complaint. The Division of Water Rights has recommended to the Court that twenty additional water users be made parties to the suit, in order that the proceedings will result in a complete adjudication of all of the water rights from North Cow Creek and its tributaries.

GENERAL DESCRIPTION OF WATERSHED

North Cow Creek is situated in the south central part of Shasta County, and flows into Old Cow Creek near Millville, about ten miles east of Redding. Old Cow Creek is a tributary of the Sacramento River.

Several small creeks rising on the west and south slope of the divide between Pit River and Sacramento River at elevations of from 4000 to 5500 feet, meet to form the main stream.

Two tributaries of importance are Mill Creek, which rises a few miles west of Silver Creek in Section 10, T 33 N., R 1 E., and enters North Cow Creek in Section 2, T 33 N., R 1 W., and Cedar Creek which rises a few miles east of Round Mountain and enters North Cow Creek in Section 36, T 34 N., R 2 W.

The flow of Mill Creek is more or less constant during the irrigation season, ranging during the 1923 season, from a high of 5.0 second feet to a low of 3.2 second feet at a point about two miles above its mouth. Most of the flow is diverted for use on lands in the Oak Run Creek watershed.

Cedar Creek contributes little water during the irrigation season as irrigation use near and above Round Mountain is made of the entire flow there. However, the stream picks up water below Round Mountain, and since there are only two users between this point and the creek mouth, some water always reaches North Cow Creek from this source.

The watershed of North Cow Creek covers an area of about 150 square miles. The eastern or upper portion of this shed is mountainous and covered, for the most part, by a dense growth of timber and underbrush. The lower part of the watershed is considerably flatter, and rockier and the vegetation is neither as hearty nor as abundant as it is farther up on the stream system.

The stream valley, itself, and the canyon floors are generally narrow, the irrigable land being found in small areas separated by rock or brush covered hills.

The elevation of the valley varies from about 700 feet at the lower end to about 3000 feet on the upper Cedar Creek ranches.

CLIMATE

The climate of the valley is typical of the interior valleys of California. The weather is warm in the summer time and mild in the winter time. Rainfall records are available for the town of Montgomery Creek which is about three miles north of the divide between North Cow and Montgomery Creeks, from 1909 to 1919, inclusive, and for Redding from 1875 to 1923, inclusive. The elevation of Montgomery Creek is about 2500 feet, and of Redding, about 550 feet.

The mean annual precipitation at these two stations based on the eleven year record kept at Montgomery Creek and the forty-nine year record kept at Redding is distributed by months as follows:

Month	Mean Precipitation in Inches	
	At Montgomery Creek	At Redding
January	12.27	7.59
February	9.58	5.73
March	5.54	5.06
April	3.87	2.89
May	2.89	2.01
June	1.11	0.61
July	0.47	0.12
August	0.17	0.06
September	1.91	0.87
October	2.74	2.22
November	6.83	3.99
December	6.36	6.39
Total	53.74	37.72

It is likely that the mean precipitation throughout the valley would be approximately the mean of that at Montgomery Creek and at Redding.

SOIL

The soil of the lands served by North Cow Creek and Tributaries varies from a fine gravel and sand formation to a sandy loam. In some parts the top soil is underlain by porous gravel strata, and in some parts, as on the Hobson Ranch, it is underlain by bed rock, sloping toward the Creek. In cases similar to the one just named, return water can be seen seeping through the creek banks when the lands adjacent are being irrigated.

CROPS

The principal crops are alfalfa, native grasses, garden products, and deciduous fruits.

RUN-OFF RECORDS

RECORDS OF U. S. G. S.

In 1911, the United States Geological Survey established a gaging station on North Cow Creek (there called Little Cow Creek) at the Highway Bridge within the SW¼ of SE¼ Section 5, T 31 N., R 3 W., one quarter mile east of Palo Cedro. Records were obtained until 1914 when the station was abandoned. The records are submitted herewith as Tables Numbers 1, 2, 3, and 4.

North Cow Creek

In 1916, the following miscellaneous measurements were made on North Cow Creek.

Date	Place	Discharge Second Feet
Aug. 18	NE¼ Sec 9, T 32 N, R 3 W, 200 feet below Cook and Butcher Diversion	2.4
Aug. 18	NE¼ Sec. 20, T 32 N, R 3 W, above mouth of Dry Creek.	1.6
Aug. 18	Just below mouth of Dry Creek	4.9
Aug. 18	SE¼ Sec. 8, T 31 N, R 3 W, at abandoned station . . .	4.1
Sept. 18	200 feet below Cook & Butcher Diversion	4.0
Sept. 18	Above mouth of Dry Creek	5.3
Sept. 18	Below mouth of Dry Creek	6.6
Sept. 19	At abandoned station	8.6

Cook and Butcher Ditch

On August 18th and September 18th, 1916, the U.S.G.S. measured the flow of "Little Cow Creek canal", herein named Cook and Butcher Ditch, at a section 200 feet below the intake. The results were 6.8 cubic feet per second and 0.8 cubic foot per second, respectively. Adding the amount diverted by the canal to the flow in North Cow Creek below the diversion on the same date, there would result, 8.7 cubic feet per second above the diversion on August 18th, and 4.8 cubic feet per second there on September 18th.

In comparing these records with the record obtained during the 1923 season by the Division of Water Rights, the increase in irrigation use of water from the creek above the Cook and Butcher Ditch Diversion should be borne in mind.

RECORDS OBTAINED BY DIVISION OF WATER RIGHTS

Measurements were made of the flow of North Cow Creek and its

tributaries by a representative of the Division of Water Rights during the period between June 5th, 1923 and October 15, 1923. The records follow:

Cedar Creek

On June 28th a current meter measurement made on the H. O. Bishop ditch, the uppermost ditch from Cedar Creek, showed a flow of 1.48 cubic feet per second. It is estimated that about 0.50 cubic foot per second was passing the diversion dam, making the total estimated flow of the creek at this point, about 2.0 cubic feet per second.

On June 30th, arrangement was made with the owners of the Johnson Haley Ditch to let all the water flow down to the Halcumb Ditch to be measured therein. A flow of 3.44 cubic feet per second was metered in the latter and allowing for some seepage through the rock and brush dam, an estimate of 4.0 cubic feet per second in the creek at this point would appear reasonable.

The flow of Cedar Creek fell off until the end of the next month; when it reached a stage which remained practically constant until the first fall rains on September 22nd. On September 3rd a float measurement just above the Johnson-Haley Diversion showed a flow of 0.75 cubic foot per second.

A staff gage was installed at Ward's Bridge, on Cedar Creek, about a quarter of a mile above the confluence with North Cow Creek. At this point four current meter measurements were made during the season, from which a rating curve was prepared. Gage heights, observed by Mr. R. P. Ward and by the Field Engineer, together with the current meter measurements, furnished the data for a run-off record during the irrigating season. This record is submitted as Table Number 5.

It should be noted that the gage was below all diversions on Cedar Creek but was also below the tributaries Tolidy Spring Channel, Minnie Gulch,

Pehrson's Gulch and Long Gulch, all of which except the one first named, flow into Cedar Creek below Round Mountain, that is, below all users except the Hadley and Smith places.

Tolidy Spring Channel

The water for this channel rises in a spring east of Albert S. Patton's ranch and is all used by him. The channel cuts through Patton's place, picking up whatever return water there may be and empties into Cedar Creek a short distance below Erickson's Diversion.

The flow of the spring was measured at Patton's South Ditch diversion dam on June 15th and found to be 0.79 cubic foot per second.

Minnie Gulch

A float measurement made September 4th on the Benbow Ditch just below its re-diversion from Minnie Gulch showed a flow of 0.19 cubic foot per second. This was all the water in the gulch at the time. Since no water was being emptied, nor had been emptied for some days into the gulch by the Benbow Ditch above, this measurement indicates the flow of the gulch.

Pehrson's Gulch

This is a gulch that heads at the northern end of Pehrson's property and carries his return water to Cedar Creek, emptying therein just above Hadley's upper diversion. No measurements were made of the flow of this gulch, but at different times during the season it was estimated to have been as much as 1.00 cubic foot per second.

Long Gulch

This gulch heads near the southern end of Pehrson's property and

empties into Cedar Creek on the Smith place. This gulch was dry during practically the entire irrigation season.

North Fork of North Cow Creek

No measurements were made on this creek. On June 29th, however, the combined flow of the Sam Rice Ditch and the Benbow Ditch, the two uppermost ditches on the creek, was 5.16 cubic feet per second. There was a flow of probably 5.0 cubic feet per second passing the lower diversion dam, making the estimated total flow about 10 cubic feet per second.

Middle Fork of North Cow Creek

No measurements were made on this creek.

Unnamed Tributary of Middle Fork of North Cow Creek

On June 29th, 0.88 cubic foot of water per second was measured with current meter in the F. H. Kenyon Ditch near its point of diversion from the above tributary. There was a flow of probably 3.0 cubic feet per second passing the diversion dam.

South Fork of Mill Creek

On June 7th, the flow in the Excelsior Ditch above its diversion from this fork was found to be 1.54 cubic feet per second by current meter measurement. A flow of 3.78 cubic feet per second was similarly measured in the ditch just below its diversion from the fork, the total flow of which was being diverted. The difference of 2.24 cubic feet per second represents the flow of the fork on this date.

Mill Creek

A staff gage was installed on Mill Creek about fifty feet above the Welch and Strayer Ditch diversion. A rating curve was plotted based on four current meter measurements made at this station during the season. The gage was read by Mr. J. B. Carswell and by the Field Engineer. The record obtained is submitted as Table Number 6.

Although the total flow of Mill Creek and its South Fork is diverted by the Welch and Strayer and Excelsior Ditches, during the irrigating season, a considerable flow gathers in the creek below these diversions due possibly to seepage from the ditches and to numerous small springs in the canyon. A staff gage was installed on the creek just above its junction with North Cow Creek but no gage reader could be procured. However, two current meter measurements were made and three readings of the gage obtained which data has been used in the preparation of Table Number 7.

North Cow Creek

Staff gages were installed on North Cow Creek at Phillips' Mill Bridge, at Asher's Ranch and at Butzbach's Ranch. Gage readings were obtained by Mr. E. J. Phillips at the first named gage and by Mr. J. C. Asher and Mr. H. H. Butzbach at the other two. These readings were supplemented by occasional readings made by the Field Engineer. Four current meter measurements were made at Phillips' Mill Bridge, four at Asher's Ranch and three at Butzbach's Ranch from which measurements rating curves were drawn for the respective gages. The records obtained are submitted as Tables Numbers 8, 9, and 10.

In addition to the above records, estimates of the flow passing the Woodman Ditch Diversion dam and the Cook and Butcher Ditch Diversion

dam both on North Cow Creek were made at various times as follows:

Date	Estimated Flow in Second Feet Passing Woodman Ditch Dam	Estimated Flow in Second Feet Passing Cook & Butcher Ditch Dam
July 24:	# 0.60	
July 27:	0.75	
Aug.10 :	# 0.25	
Aug.23 :	# 0.25	
Aug.25 :	0.50	0.75
Sept.4 :		* 0
Sept.5 :		* 0
Sept.6 :		* 0

Estimate made by Charles Lemm.
* Creek dry above dam as per J. G. Chatham.

The bottom of the creek at the measuring section at Asher's Ranch was rocky and gravelly. For this reason it was thought probable that some sub-surface flow might exist which obviously would not be apparent in any current meter measurement. With this possibility in mind, a section was chosen about one-half mile downstream where the bottom of the creek was bed rock, and two current meter measurements were made on August 4th as follows:

Section	Discharge Second Feet	Percentage Difference
North Cow Creek at Asher's Ranch	5.83	
North Cow Creek about 1/2 mile below Asher's Ranch	5.90	+ 1.2

Strawn Gulch

This name is here applied to the gulch cutting through Strawn's lower place and emptying into North Cow Creek about one quarter mile below Phillips' Bridge. During the irrigating season the gulch, otherwise dry, carries excess water from the Pehrson-Grant-Strawn Ditch and return water

from Strawn's upper place. No measurements were made of the flow of this gulch which varied from zero to an estimated flow of 1.5 cubic feet per second on July 21st. The estimate was arrived at as follows: a current meter measurement of the water from Strawn's upper place was 0.94 cubic foot per second. The flow turned into the gulch from the Pehrson-Grant-Strawn Ditch was estimated at 0.5 cubic foot per second, making the total estimated flow of the gulch about 1.5 cubic feet per second.

Dungan Gulch

This is the name here given to the channel picking up spring water southeast of Dungan's Ranch and flowing through the ranch. This water is all used by Mr. Dungan during the irrigation season but his return water returns to the channel and thence to North Cow Creek above Eldridge's upper diversion. The flow of the two springs feeding the channel above Dungan's place was measured on June 20th as follows:

Spring	Flow	Method of Measurement
Main Spring	0.50 second foot	Current meter.
Smaller Spring	.056 second foot	Float.
Total - - - - - -	0.556 second foot	

Little Valley

This is a gulch, fed by several small seepages, that empties into North Cow Creek above Eldridge's upper diversion. A float measurement made June 20th of the principal spring showed a flow of .027 cubic foot per second.

Woodman Creek

No water was observed in Woodman Creek during the period of the investigation.

Divide Creek

No flow was observed in this creek during the period of the investigation although pools of water in the creek bottom were noted during the latter part of June.

Dry Creek

No water was observed in this creek during the period of the investigation.

USE OF WATER AND DIVERSION MEASUREMENTS

The waters of North Cow Creek and its tributaries are used for domestic and stockwatering purposes and for the irrigation of 1514.2 acres of land. In one instance there is also the use for the development of power for the operation of a planing and saw mill.

A transit and stadia survey of the diversion systems and the irrigated areas in the North Cow Creek watershed was made by the Division of Water Rights in the summer of 1923, excepting those areas on the Pehrson, Grant, Strawn, Eldridge, Bibbens, Hobson, and Ward ranches, which were surveyed by Engineer Charles T. Dozier of Redding, in 1921, and those areas on the Turner, Frisbee, Dozier, and Ellerkamp ranches, which were surveyed by plane-table in 1924 by the Division of Water Rights. In the case of the surveys made by Charles T. Dozier, the data shown on the Dozier maps were checked in the field, and such additional data as were necessary were obtained.

The data obtained from these surveys has been plotted on a scale of one inch to three hundred feet, and the twenty-nine sheets obtained have been inked and reproduced. A map of the entire North Cow Creek watershed, together with the Oak Run Creek watershed, on a scale of one inch to [illegible] forty feet has been prepared from the data obtained from these sheets. A key map showing the location of the map sheets, numbers 1 to 29 inclusive, has also been prepared.

The points of diversion of the various ditches have been indicated on the map by numbers 1 to 116, inclusive.

The area irrigated or sub-irrigated under the various diversion systems have been computed from the map by the use of a planimeter, and Table Number 11 has been prepared showing the acreage, legal descriptions, and kind of crops grown on these areas. The use of water under each diversion is further discussed hereinafter under the sub-heading "Description of Diversion Systems".

Measurements were made on all the various diversions from North Cow Creek and its tributaries by the Division of Water Rights during the irrigation season of 1923. These measurements were made whenever possible in the presence of the water users. Whenever sufficient water was available to fill the ditch to maximum capacity, at least two discharge measurements were made on each ditch; one to determine the flow normally used for irrigation, and the other to determine the flow required to fill the conduit to capacity. These measurements are hereinafter referred to as "the normal irrigating head" and the "maximum capacity" of the conduit, respectively. It was the practice to have the water user turn into the conduit the amount of water normally used when irrigating. This flow was then measured to determine the normal irrigating head. The conduit was then filled to capacity and a second measurement taken

to determine the maximum capacity of the conduit. The results obtained from these measurements are given under the description of the respective diversions.

DESCRIPTION OF DIVERSION SYSTEMS

Description of the diversion systems from North Cow Creek and its tributaries, taken up consecutively from 1 to 116, follow. A summary of the data contained under these descriptions is submitted in Table 19 of this report. In this table, the names of the various diversion systems are arranged alphabetically, and the corresponding diversion number, name of stream from which diversion is made, and total acreage irrigated under the system is given for each.

Diversions 1, 2, and 3 by Albert S. Patton from a channel known as Tolidy Spring Channel, tributary to Cedar Creek, and from a small unnamed spring. Number 1 diversion within the NE¼ of SW¼ Section 20, T 34 N., R 1 E., is that of the Patton South Ditch, Number 2 within the NW¼ of SW¼ Section 20, T 34 N., R 1 E., is that of the Patton North Ditch and Number 3, within the SW¼ of the NW¼ Section 20, T 34 N., R 1 E., is that of the feeder ditch from the small unnamed spring to the Patton North Ditch. The diversion dams are built of brush and rock and are installed or removed as desired. The ditches are dirt ditches except a branch of the South Ditch, which is a small wooden flume about 500 feet long and supplies domestic water to the house. The total flow of the spring channel is used, it ordinarily being rotated between the two ditches. Any water that finds its way back to the channel before it leaves the Patton place is rediverted by means of wooden turnout boxes and spread over the fields. The total irrigated acreage, including some 32.0 acres

of newly cleared and seeded pasture, under the South Ditch, is 54.6 acres of which 2.0 acres have been described as sub-irrigated. The total acreage under the North Ditch, practically all of which is cultivated or in meadow, is 36.0 acres, of which 2.1 acres have been described as sub-irrigated.

On June 15th a current meter measurement of the water in the South Ditch at its head showed a flow of 0.74 cubic foot per second. A float measurement of the water passing the dam gave .05 second foot, making a total channel flow of 0.79 second foot. It was noted that the North Ditch would accomodate the above amount of water and no measurement was made. The flow of the spring contributing to the North Ditch through the feeder ditch measured by the float method, was 0.19 cubic foot per second.

Diversion 4 by H. O. Bishop from Cedar Creek is that of the Bishop Ditch. The rock and brush diversion dam is within the SW¼ of the NE¼ Section 20, T 24 N., R 1 E., from which the earth ditch flows on a steep grade to the Bishop place, where 6.4 acres of land are irrigated by this ditch alone and 2.7 acres additional are irrigated by this ditch, augmented at times by the flow of two springs, (see Diversions 5 and 6) making a total irrigated acreage of 9.1 acres under the ditch.

On June 28th, a current meter measurement made at the head of the ditch, of the water turned in by Mr. Bishop, as being a normal irrigating head when water was available, showed 1.48 cubic feet per second.

Diversions 5 and 6 refer to diversions made by H. O. Bishop from springs rising on his own land and known as Alder Spring and Lower Spring, respectively.

Both diversions are made within the SW¼ of SW¼ Section 17, T 34 N., R 1 E., by means of small wooden V shaped flumes which carry the water to a common ditch here named the Spring Ditch which traverses the meadow to a small wooden flume serving the house with water for domestic purposes. The irrigated land under the Spring Ditch amounts to 2.7 acres which is at times irrigated by the Bishop Ditch from Cedar Creek as noted above.

Float measurements made June 28th of the water in the two diversion flumes showed a flow of 0.22 cubic foot per second and 0.029 cubic foot per second for the Alder Spring diversion and the Lower Spring diversion respectively. Mr. Bishop stated that as the flow in Cedar Creek and hence that in the Bishop Ditch decreased, the flow of the springs decreased also.

Diversions 7, 8, and 9 refer to the three diversions of the C. S. Erickson Ditch, the first being within the NW¼ of NW¼ Section 20 and the latter two within the NE¼ of NE¼ Section 19, T 34 N., R 1 E. The first is made by means of a rock and brush dam in Cedar Creek and a short V shaped wooden diverting flume, the earth ditch therefrom flowing about 200 feet to Diversion 8 which is the point where Bishop's return water empties into the Erickson Ditch. About fifty feet further downstream is the point where School House Spring Channel empties into Erickson's Ditch, here numbered Diversion 9. Upon reaching the upper end of Erickson's place, the ditch divides, each branch flowing to a meadow where it is spread out and picked up at the lower end to be used in the irrigation of the balance of the ranch. The irrigated acreage under this ditch system was 24.0 acres.

On June 28th, current meter measurements were made of the water diverted from Cedar Creek which filled the V shaped diverting flume to capacity, of the return water from Bishop's ranch and of the flow of School House Spring.

The first measurement, made about 75 feet below the head of the ditch, showed 0.75 second foot; the second, made on the ditch just below the entrance of the return water, showed 0.90 second foot, giving a return water flow of 0.17 second foot; and the third, made on the ditch just below the entrance of School House Spring showed 1.11 second feet, giving a flow of 0.21 second foot for the spring. It was noted that the flow of 1.11 second feet filled the ditch to capacity at several points below.

Diversion Number 10 is a diversion by C. S. Erickson from a spring on his own property in the SW¼ of SE¼ Section 18, T 34 N., R 1 E., M.D.M. The water flows from the spring about 200 feet through an earth ditch to a box at which a small buried pipe line to the house and garden heads. The length of the pipe line is about 800 feet and the fall 75 feet. It was noted that the size of the pipe line at the discharge end was 1 inch. The flow measured June 28th in a receptacle of known capacity was .016 cubic foot per second. The land irrigated by this system amounted to 1.1 acres.

Diversion Number 11 is made by the Sam Rice Ditch from the North Fork of North Cow Creek. This is a partnership ditch owned jointly by the Red River Lumber Company (Clyde A. Estep, lessee) and W. A. Calkins. The point of diversion is within the NW¼ of NE¼ Section 29, T 34 N., R 1 E., M.D.M. far up on the stream. From the rock and earth dam a wooden flume, 170 feet long, carries the water to an earth sidehill ditch which flows on an excessively steep grade about one and one-quarter miles to a point where the water is equally divided; one-half being turned into the Red River Lumber Company ditch which flows about three-eights of a mile to the company's 10.2 acres of irrigated land, and 0.6 acres of sub-irrigated land; and the other half flowing

about two miles through W. A. Calkin's excessively steep ditch to the 10.0 acres of land thus far irrigated on his ranch.

On June 29th, the ditch was filled to capacity by Mr. Estep, and the flow near the head of the ditch measured with current meter was 2.53 second feet. The normal irrigating head as turned in by Mr. Estep and measured with current meter about one mile below the head of the ditch, was 2.18 second feet. The flow in the Red River Lumber Company's ditch just below the earth and rock division point was 1.03 second feet as compared with a theoretically proper amount equal to one-half of 2.18 second feet or 1.09 second feet. The Red River Lumber Company place depends on the ditch for domestic water but water is carried from a spring for domestic purposes at the Calkins place.

√

Diversion 12 refers to the diversion from the North Fork of North Cow Creek made by the Benbow Ditch, jointly owned by E. F. Johnson and Alex Hansen (Mr. Hansen's share was owned by Mrs. Florence McCandless at time of investigation). A large V shaped wooden diversion flume about 250 feet long diverts the water within the SW¼ of NW¼ Section 29, T 34 N., R 1 E., and empties it into an earth sidehill ditch which carries the water for about one and three-quarter miles on an excessive grade, in most places, to Minnie Gulch from which it is later rediverted. (For use see Diversions 30, 31 and 34.)

The maximum flow that the ditch would carry, as limited by the diversion flume, was measured June 29th with current meter as 2.63 second feet. The water was regulated by Mr. Johnson who, after the maximum capacity measurement, reduced the flow to the normal irrigating head which was

measured at 2.20 second feet with the current meter. The measurements were made at a section about 300 feet below the head of the ditch.

Diversion 13 is the point within the NE¼ of SE¼ Section 30, T 34 N., R 1 E., on the North Fork of North Cow Creek at which the Earl Patton Ditch takes out. The dam is of rock and brush and the ditch of earth.

On June 15th the water flowing in the ditch was measured with a current meter as 1.19 second feet. Mr. Albert S. Patton, father of the owner, stated that this was the ordinary head used for irrigation. The ditch was then filled to capacity by Mr. Patton, Sr. and the meter measurement which followed showed 1.43 second feet. (For use under this ditch see Diversion 15).

Diversion 14 is a diversion within the SW¼ of NE¼ Section 30, T 34 N., R 1 E., by Earl Patton from a spring channel. The ditch, about 460 feet long, irrigated 2.1 acres of garden and meadow in 1923. The run-off from this acreage formed a swamp from which water was rediverted for the irrigation of an additional 1.4 acres, making a total irrigated acreage under the ditch of 3.5 acres. When this ditch is being used the total flow of the spring is diverted and when not being so used, the water is diverted at Diversion 15, whence it goes through an earth ditch to augment the flow of Patton's Cow Creek Ditch.

Diversion 15 as above mentioned is a diversion by Earl Patton from a spring channel. The earth and brush diverting dam is within the SW¼ of NE¼ of Section 30, T 34 N., R 1 E.

A current meter measurement on June 15th of the flow in the ditch from Diversion 15 just above the point where this ditch empties into the

Cow Creek Ditch, showed 0.17 second foot. This figure would represent the flow of the spring, and also the flow of the ditch from Diversion 14 on which no measurement was made.

The Cow Creek Ditch carrying water from Diversions 13 and 15, irrigated 19.4 acres in 1923. The waste water from the lower part of this area was rediverted from its course and used to irrigate 5.7 acres of rough, uncleared, seeded, sidehill pasture, making a total of 25.1 acres irrigated by the ditch, of which 0.1 acre is described as sub-irrigated.

Diversion 16 refers to Earl Patton's diversion from a spring within the NW¼ of SW¼ Section 30, T 34 N., R 1 E. This spring has been developed by Mr. Patton and is now used by him through a short pipe line and ditch for the irrigation of his garden (0.5 acre). Water from the spring is also carried to the house for domestic use. The flow as determined June 15th, by float measurement was 0.021 cubic foot per second.

Diversions 17, 18, and 19 refer to F. H. Kenyon's ditch diverting from an unnamed tributary of the Middle Fork of North Cow Creek and the two springs near the Creek diversion that contribute to the ditch. The three diversions are within the SE¼ of SE¼ Section 28, T 34 N., R 1 E.

On June 29th current meter measurements were made on the Kenyon Ditch as follows:

The normal irrigating head turned into the ditch by Mr. Kenyon was 0.88 second foot measured at the head of the ditch. A measured flow of 1.02 second feet filled the ditch above Diversion 19 to capacity. Below Diversion 19, the flow was 1.33 second feet, indicating a flow of 1.33 -

1.02 or 0.31 second feet for the spring (Diversion 18).

The flow of the small spring (Diversion 18) was estimated at 0.005 cubic foot per second on August 30th.

From the rock and brush dam in the creek the earth ditch flows about four hundred feet where the small spring empties in. About 700 feet farther downstream, the ditch empties into a gulch just above a spring and is rediverted a short distance below after picking up the spring water (Diversion 19). About one mile below this point the use of water from the ditch for irrigation is begun, 22.2 acres was the irrigated acreage under the ditch.

A large fish pond belonging to Mr. Kenyon of approximately 3.0 acre feet capacity is maintained by his ditch. An outlet ditch from the pond to the creek irrigates the lower end of the house yard, and 0.5 acre of garden, all of which has been included in the 22.2 acres above. The pond, however, serves neither as a storage nor regulatory reservoir for irrigation.

Diversion 20 is Mr. Kenyon's upper diversion from an unnamed spring channel. The diversion is within the SE¼ of SE¼ Section 29, T 34 N., R 1 E. The earth ditch therefrom, about 1000 feet long, irrigates 2.7 acres of meadow which although swampy in the spring time, dries out to the point of requiring irrigation in the summer and fall. An area of 0.2 acre has been classified as sub-irrigated, making a total area of 2.9 acres under the ditch.

A float measurement made on the ditch June 29th, gave a flow of 0.17 cubic foot per second. This was the total flow of the spring channel.

Diversion 21 refers to the diversion of the Kenyon Middle Spring Ditch within the NW¼ of NE¼ Section 32, T 34 N., R 1 E., from the same spring channel as above. No measurement was made, as the flow available for this ditch is the same as that for the Kenyon Upper Spring Ditch when the latter is not in use. This earth ditch, which is about 1000 feet long, irrigated 2.3 acres of land.

Diversion 22 refers to the diversion within the SW¼ of the NE¼ of Section 32 of the small Kenyon Lower Spring Ditch. The ditch, which diverts from the same spring channel as above is about 400 feet long and irrigates 0.4 acre of meadow. No flow measurements were made.

Diversion 23 is the point where the unnamed spring channel affording water for Diversions 20, 21, and 22, empties into the Kenyon Ditch from North Cow Creek. Water from this diversion was negligible during the 1923 season. Land irrigated under the Kenyon Ditch below this diversion has been included in the 22.2 acres total under the Kenyon Ditch.

Diversion 24 refers to the diversion of the John Kenyon ditch within the NW¼ SW¼ of Section 34, T 34 N., R 1 E. This ditch diverts from the Middle Fork of North Cow Creek, and is owned by Del Turner, E. C. Frisbee, and C. T. Dozier. From the point of diversion the ditch runs in a westerly direction some two miles to a reservoir of about 38.5 acre feet capacity, located in the NW¼ SE¼ of Section 31, T 34 N, R 1 E., approximately in the center of the section. Prior to reaching the reservoir, one acre of land is irrigated. From

the reservoir, augmented by the flow of a spring, (Reservoir Spring, Diversion 35) eight acres of garden, pasture, and orchard are irrigated. The waste water flows into two channels tributary to the creek, where it sinks into the ground, no return water reaching the creek, as surface flow.

A series of current meter measurements were made on this ditch on July 17, 1924, as follows:

About 100 feet below the brush and rock dam at the head of the ditch a measurement of 2.42 second feet was obtained. This quantity was said to be the normal irrigating head by Mr. Snider, the lessee, and was also the maximum capacity of the ditch. About one quarter mile downstream another measurement was made, resulting in 1.94 second feet. The difference between these two measurements, 0.48 second feet, flows directly back to the creek. A current meter measurement made at the point where the ditch enters the reservoir resulted in 0.57 second feet. The difference between the last measurement, 0.57 second feet, and the second measurement, 1.94 second feet, is 1.37 second feet, which is the loss of the ditch in seepage and evaporation in traversing the distance of approximately two miles. It should be noted, however, that a forest fire was in progress over the area traversed by a great portion of the ditch, and it is probable that a part of the above mentioned loss of 1.37 second feet may be attributed to brush and other debris in the channel as a result of the fire. A float measurement of the discharge of the reservoir, at a point 1000 feet below the reservoir outlet gave a result of 0.85 second feet. As this figure is greater than the inflow of the reservoir, the difference, 0.28 second feet, is taken as the probable flow of the spring flowing into the reservoir. This spring is located so close to the reservoir, on low marshy ground, that it was not possible to

make a direct measurement of its discharge.

Diversion 25 is the spring flowing into the Dozier-Frisbee-Turner reservoir and referred to in the description of Diversion 24. It is situated in the NW¼ SE¼ of Section 31, T 34 N, R 1 E. Its flow is estimated to be 0.28 cubic foot per second. The acreage irrigated under this diversion is included in that of Diversion 24.

Diversion 26 is a diversion from a spring, herein called Garden Spring. The spring and diversion lie within the SW¼ NW¼ of Section 31, T 34 N, R 1 E. The water is diverted at the source and used to irrigate 1.1 acres of garden, pasture, and grain. Waste from this irrigated acreage flows into a small willow-covered pond and after discharging from the pond, flows a short distance toward North Cow Creek and disappears into the ground. This discharge from the pond was estimated to be 0.25 cubic foot per second.

Two measurements of the flow of Diversion 26 were made, one on July 20, 1923, and one on July 17, 1924. The former measurement showed 0.064 cubic foot per second, and the latter 0.074 cubic foot per second.

Another smaller spring with an estimated flow of 0.025 cubic foot per second is located about 1500 feet above the Garden Spring. The water disappears into the ground after flowing about 300 feet in a channel. The channel, however, empties into the Garden Spring.

Diversion 27 is the diversion into a three quarter inch pipe line from a small spring which is located in the SE¼ NW¼ of Section 31, T 34 N, R 1 E, and is used as a source of domestic water supply at the E. C. Frisbee dwelling.

A volumetric measurement made at Frisbee's house showed the discharge of this spring to be 0.025 cubic foot per second.

Diversion 28 is the ditch of Richard Ellerkamp, diverting from North Cow Creek in the SE¼ NW¼ Section 36, T 34 N, R 1 E, and 1.5 acres of garden and vineyard are irrigated from this diversion, augmented by the discharge of a small springy bog or swamp, which flow is estimated to be 0.025 cubic foot per second.

When irrigating, the water is dumped into a series of very small ponds, and rediverted into ditches serving the various lands to be irrigated. The largest of these ponds has a capacity of approximately 0.1 acre foot.

The waste water returns to North Cow Creek through a channel about 150 feet in length. This return water was measured by current meter and found to be 0.36 cubic foot per second.

On July 17, 1924, about 100 feet below the head of the main ditch a current meter measurement was made, showing 0.52 cubic foot per second. This quantity is the normal irrigating head used, and is also the maximum capacity of the ditch.

Diversion 29 is the diversion of the Pehrson-Grant-Strawn Ditch within the NE¼ of NE¼ Section 36, T 34 N, R 1 W, from North Cow Creek. Interests in this ditch are A. F. Pehrson 1/2, A. H. Strawn 1/4, and Jesse Grant 1/4. About two miles below the rock and brush diversion dam, the ditch divides, one-half going about one mile farther to the Pehrson ranch, and the other half going to the Strawn and Grant ranches.

About one quarter mile below this division, a takeout box in the Strawn- Grant ditch turns water into A. H. Strawn's regulatory reservoir, having a capacity of about 1.5 acre feet. The reservoir was not in use at the time of the survey, September 18th.

Mr. Strawn has two other takeouts in the ditch which turn out water for the irrigation of 26.7 acres of irrigated and 0.6 acres of sub-irrigated land on his upper place. In addition, 5.4 acres of irrigated land and 0.2 acre of sub-irrigated land on his lower place ($W\frac{1}{2}$ of $NW\frac{1}{4}$ Section 2) are watered by waste water from the upper place and water that may be turned out of the Pehrson-Grant-Strawn Ditch, just above the main division box, into a branch of Strawn Gulch. Two small springs rising on Mr. Strawn's upper place augment the supply of ditch water (see Diversions 72 and 73).

The remaining one-half of the total flow of the Strawn-Grant Ditch goes to the Grant ranch, where 33.8 acres were irrigated thereby. The return water from these lands is diverted by the Borquist Ditch which irrigates 1.2 acres of pasture on Mr. Grant's place, already included in the 33.8 acres above, and then flows to the A. F. Pehrson place (see Diversion 75). (See Diversion 74 for remaining use of water by Mr. Grant).

Mr. Pehrson's irrigated lands amounted to 55.5 acres directly under the Pehrson Branch of the Pehrson-Grant-Strawn Ditch, and 7.3 acres under the Borquist Ditch, carrying return water from the Grant ranch, also 1.5 acres of sub-irrigated land, making a grand total under the Pehrson-Grant-Strawn Ditch of 64.3 acres of irrigated and sub-irrigated land. Five springs augment the water supply available for Mr. Pehrson's ranch but inasmuch as the waters therefrom are co-mingled with the ditch water, no attempt was made to segregate the acreage under these springs from the total under the main ditch (see Diversions 76, 77, 78, 79, and 80 for springs; also Diversion 39 for remaining use of water by Mr. Pehrson).

On June 6th a current meter measurement was made, in a flume about 1000 feet below the head of the ditch, of the water then being diverted.

The result was 2.85 second feet. However, since the irrigation season had hardly begun and the diversion dam had not been repaired, this amount was considerably less than that used later in the summer. About one month later (July 11th) additional current meter measurements were made on the ditch. The ditch was flowing full with no water spilling over as is shown by the measurement results. On the way up ditch the measured flow in the flume just above the main division box was 5.39 second feet. The measured flow, in the flume about 1000 feet below the head of the ditch or about two miles above the last named measurement, was 5.42 second feet. The difference between the two measurements (0.03 second foot) indicates that there is no appreciable seepage loss in the ditch.

Diversion 30 is the point of diversion of the Benbow Ditch from Minnie Gulch, which rediverts the water turned into the gulch by the Benbow Ditch from North Fork of North Cow Creek, and diverts whatever natural flow and return water flow from the Red River Lumber Company Ranch there may be in the gulch. The rock and brush dam making the diversion is within the NW¼ of SW¼ Section 24, T 34 N, R 1 W, whence the ditch flows about three-quarters of a mile to a flume across Cedar Creek. At this flume the water is divided as equally as possible by inserting a board and forcing an estimated half of the water through an opening, in the side of the flume into Cedar Creek. This half, belonging to Florence McCandless, flows down the creek about 800 feet to her point of diversion of Cedar Creek water and rediversion of Benbow Ditch water (see Diversion 34). The other half flows to within about 100 feet of the upper end of E. F. Johnson's fields where it is co-mingled with his half of the Johnson-Haley Ditch (Diversion 31) for use on the place.

The Benbow Ditch from Minnie Gulch was not used during the 1923 season. A float measurement made at the head of the ditch on September 4th showed 0.19 second foot, which was the flow of the gulch since no water was being, nor had been, turned in by the Benbow Ditch (Diversion 12) for some time. This ditch appeared to be, when in repair, of ample capacity to accomodate as much water as would the Benbow Ditch from the North Fork of North Cow Creek.

Diversion 31 within the NE¼ of NW¼ Section 24, T 34 N, R 1 W, is that of the Johnson-Haley Ditch from Cedar Creek. A natural rock dam is made to turn the water into a V shaped wooden flume about 100 feet long, which empties the water into an earth ditch. The water is divided as nearly equally as possible by means of an earth and rock dam about one-quarter mile below the diversion, Johnson's share crossing the Holcumb Ditch by means of a wooden flume about 1000 feet below. About 300 feet below this flume crossing, the ditch joins Johnson's share of the Benbow Ditch, for use on his lands. Mr. Johnson has 28.9 acres of irrigated and 1.8 acres of sub-irrigated land under the combined ditches. (See Diversion 35 for balance of Mr. Johnson's use of water).

The Haley portion of the ditch water flows about three-quarters of a mile farther to his irrigated area, amounting to 30.9 acres of irrigated and 1.7 acres of sub-irrigated land under the ditch.

On June 27th, a current meter measurement of the flow of the ditch which Mr. Johnson stated to be a normal irrigating head, showed 1.28 second feet. After the ditch had been filled to capacity by Mr. Johnson, a current meter measurement showed 1.64 second feet. The latter flow was divided at the point of division and a current meter measurement, showing 0.74 second foot

was made of the flow in Johnson's portion of the ditch as compared with an intended flow of one-half of 1.64 or 0.82 second foot.

Diversion 32 within the SW¼ of SW¼ Section 13, T 34 N, R 1 W, diverts water from Cedar Creek by means of a rock and brush dam to the Halcumb Ditch owned by Mrs. Ida Bidwell. About two miles below the diversion, the ditch reaches the Bidwell lands, all of which lie in the Montgomery Creek watershed. An area of 43.6 acres was irrigated at least once in 1923, and an area of 23.3 acres has been irrigated since 1916, and an area of 3.0 acres was classified as sub-irrigated, making a grand total of 69.9 acres.

Until about June 1st some water is available from Doris Creek (Montgomery Creek watershed) at the point where the Halcumb Ditch crosses it. This creek is in the Montgomery Creek watershed and furnishes water at a time when there is an ample supply available for all users.

About one and one-half miles below the Cedar Creek diversion, the ditch crosses the Highway to Montgomery Creek. Just above this crossing a staff gage was installed, on which eleven readings were obtained during the season which, together with two current meter measurements at this point, form the basis for the estimated amount of water used by the Halcumb Ditch, submitted as Table Number 12. It will be noted that the estimated seasonal use was 136 acre feet. This, however, may not be a criterion of the normal use, for a part of the 43.6 acres irrigated in 1923 was only irrigated once in addition to which there was 23.3 acres not irrigated at all during 1923.

On June 30th, in company with Mr. Bidwell, current meter measurements were made of the normal irrigating head and the flow required to fill the ditch to capacity. The measurement, of the normal irrigating head when

water is available, made about two hundred feet below the head of the ditch, gave 2.52 second feet. The flow, required to fill the ditch, was 3 44 second feet.

Diversion 33 within the SW¼ of SW¼ Section 13, T 34 N, R 1 W, refers to the diversion of Fred Roe's Ditch from Cedar Creek. A diverting wooden flume of rectangular section one foot wide by four inches deep empties the water into a ditch about 800 feet long which makes delivery to the 7.1 acres of irrigated land.

A current meter measurement made of the water being used for irrigation on June 27th showed 0.38 second foot. This amount filled the flume at the head of the ditch to capacity.

Diversion 34 within the NE¼ of NE¼ Section 23, T 34 N, R 1 W, refers to the diversion of the McCandless Ditch (Alex Hansen, present owner) from Cedar Creek. This ditch diverts part of the natural flow of Cedar Creek and rediverts the water emptied into the creek by the Benbow Ditch (see Diversion 30). The dam is of rock and brush and the ditch of earth. An area of 10.8 acres has been irrigated by the ditch during recent years.

On July 5th, a measurement was made with current meter of the normal irrigating head from Cedar Creek alone as turned into the ditch by Mrs. Willis Elder (formerly Mrs. McCandless) the owner at that time. The result was 0.42 second foot. It was noted that the limiting section of the ditch, if repaired, was 0.20 feet deeper with side slopes of 1 to 1. By using the hydraulic elements obtained from the current meter measurement, assuming n = 0.025 and solving in Kutter's Formula for slope, there results Slope = 0.0027. Using this value of slope, n = 0.025, the elements of the

section 0.2 foot deeper and solving Kutter's Formula for Velocity, there results velocity = 1.20 feet per second for this limiting section. The computed area of the section was 0.92 square foot, hence the computed flow that the limiting section would accomodate is 0.92 x 1.20 = 1.10 second feet.

Diversion 35 within the SW¼ of SE¼ Section 14, T 34 N., R 1 W., refers to E. F. Johnson's ditch diverting waste water from a channel that flows down from Haley's place.

An irrigated area of 2.4 acres lies below the ditch, half of which was irrigated in 1923. A sub-irrigated meadow of 1.3 acres is also under the ditch, making a total irrigated area of 3.7 acres.

No hydraulic measurements were made.

Diversion 36 within the SW¼ of SE¼ Section 14, T 34 N, R 1 W, refers to McCandless Waste Water Ditch now owned by Alex Hansen from the same waste water channel as Diversion 35. The diversion dam and ditch were hardly discernable. On account of the change of ownership of this property and ditch, the status of the latter was not obtained. The acreage recently irrigated under the ditch is 17.8 acres.

No hydraulic measurements were made.

Diversion 37 within the SW¼ of SW¼ Section 14, T 34 N, R 1 W, refers to the McCandless Upper Spring Ditch, now owned by Alex Hansen. The ditch, swales into which it empties, and rediversion ditches, have irrigated in recent years 12.2 acres.

The water for the channel from which Diversions 37 and 38 are made, is supplied by a spring known as the Frank Storey Spring, but now owned by Alex. Hansen. A float measurement on July 7th of the flow of this spring

showed 0.19 second foot.

Diversion 38 within the SE¼ of SE¼ Section 14, T 34 N, R 1 W, refers to the diversion of McCandless Lower Spring Ditch, now owned by Alex Hansen, diverting from the channel carrying the water of the Frank Storey Spring. 3.5 acres of land have been recently irrigated under this ditch.

In addition to the above mentioned irrigated tracts on the Hansen place, there is a sub-irrigated area of 7.3 acres which is brushy bottom land along the return water channel from the Haley and Johnson places. This area of 7.3 acres, rough and uncleared, is partly sub-irrigated and partly naturally irrigated from overflow waters, and could not be alloted to any ditch.

Diversion 39 within the NE¼ of SE¼ Section 22, T 34 N, R 1 W, refers to the rock dam diversion made by A. F. Pehrson's Cedar Creek Ditch. This ditch is about 600 feet long and carries water to a 0.6 acre garden at the side of the Highway.

The capacity of this ditch as computed from data taken in the field is 0.93 second foot.

Diversion 40 within the NE¼ of NE¼ Section 28, T 34 N, R 1 W, refers to the rock and brush dam in Cedar Creek at which the Hadley Upper Ditch heads. The head of the ditch is a wooden flume section which empties into an earth ditch about one and one-quarter miles long, winding along the side of the canyon and irrigating 17.0 acres lying in the canyon bottom.

On June 27th a current meter measurement made of the flow in the flume section at the head of the ditch showed 1.60 second feet. Mr. Hadley stated that this was the head ordinarily used for irrigation, and it was noted that the flume section was filled to capacity thereby.

Diversion 41 within the NE¼ of NW¼ Section 28, T 34 N. R 1 W. refers to J. G. Hadley's Lower Ditch from Cedar Creek. A small earth diversion dam turns water into an earth ditch about one thousand feet long that irrigated 2.1 acres of land in 1923 and under which there is an additional area of 1.7 acres of cultivated land at one time irrigated but date of last irrigation not obtained.

No hydraulic measurements were made on this ditch but its capacity was estimated at 0.50 second foot.

Diversion 42 within the NE¼ of NE¼ Section 29, T 34 N, R 1 W, is made by E. L. and Frances Smith's rock and earth dam in Cedar Creek. The water is carried through a gravelly sidehill ditch for about a quarter of a mile at which point it is dropped into a hole at the foot of a mountain. About three-eighths of a mile south on the opposite side of the mountain, the water returns to the surface at the head of Smith's distributing ditch here named Mountain Ditch. The area irrigated thereunder is 7.7 acres.

Below the above area, one branch of the ditch meets the Long Gulch Ditch (Diversion 43) at a four-way flume across Cedar Creek. Here the water of the two ditches can be joined for the irrigation of a 0.9 acre field on the west side of Cedar Creek or for the irrigation of a 9.9 acre field about a half mile downstream on the east side of the creek. Or, the water from either ditch can be used for the irrigation of either or both of the above two fields.

Of the area of the 9.9 acre field, 3.1 acres were irrigated in 1923, while the last date of the irrigation of the balance is not known by the present owners.

On October 12th, current meter measurements were made of the flow in the ditch entering the mountain and of the flow leaving. The flow entering was 0.70 second foot and that leaving was 0.84 second foot, or a gain of 0.14 second foot in passing through the mountain. A short rain on October 11th as well as intermittent rains during the two weeks prior to this date, may have modified the relationship which would exist during the irrigation season.

Diversion 43 within the NW¼ of SW¼ Section 29, T 34 N, R 1 W, refers to the diversion of the Smith Long Gulch Ditch from Long Gulch. From the earth and rock diversion dam the ditch follows the lower end of Smith's field for about 800 feet to the four way flume described above. The acreage irrigated under this ditch can also be irrigated by the branch of the Mountain Ditch and has been described thereunder. (Diversion 42).

The capacity of the ditch computed from data obtained in the field is 1.13 second feet.

Diversion 44 within the SW¼ of NW¼ Section 29, T 34 N, R 1 W, is the head of a small buried pipe line about 250 feet long from a hillside spring to the Smith house and yard. The area irrigated is 0.4 acre.

On July 7th the flow of the pipe line was measured in a can of known capacity, as .015 second foot. This represented the capacity of the pipe line and approximately the flow of the spring.

Diversion 45 within the NW¼ of SE¼ Section 5, T 33 N, R 1 E, refers to the diversion of the Welch and Strayer Ditch from Mill Creek. A temporary rock dam diverts the water into an earth ditch on the west side of the Creek. About two hundred feet down stream, the ditch crosses the creek on a wooden flume thence along the side of the canyon for about a quarter of a mile where,

by means of wooden flumes, it crosses two watercourses which join a short distance below, to form the South Fork of Mill Creek. The ditch then follows the sidehill for about a half mile, where within a distance of about seven hundred feet, three small springs (Diversions 46, 47, and 48) empty into About a mile below these springs the ditch crosses the divide between Mill Creek and Oak Run Creek watershed and empties into a branch of Oak Run Creek.

This water, together with part of the natural flow of Oak Run Creek, is rediverted about three and one-half miles lower down. This diversion and rediversion is Diversion 9 in the Oak Run Creek Report, and is described therein together with use, records, etc.

Staff gages were installed on the Welch and Strayer Ditch about five hundred feet below the diversion and on Oak Run Creek at about the place where the Welch and Strayer Ditch was said to terminate and the Creek to begin.

Six current meter measurements, one float measurement, and inte ent gage readings during the season by the owners of the ditch and the Field Engineer were used as a basis for an estimate of the total diversion for the season. This estimate is submitted as Table Number 13.

Six current meter measurements and intermittent gage readings during the season, as above, made at the lower gage, were used to estimate the total amount of water brought into Oak Run Creek by the Welch and Strayer Ditch. This estimate is submitted as Table Number 14.

After the season had progressed it was thought that there might be some sub-surface flow in Oak Run Creek at the location of the lower gage. On July 26th and August 23rd, current meter measurements were made that appear to bear out such contention. A section was chosen about eight hundred feet below the gage where the stream bottom was firm and made up of fine material; the section at the gage being gravelly and loose. No surface water reached the

creek between the two sections on either day. The results are tabulated as follows:

Date	Second Feet in Section at Gage (Q-1)	Second Feet in Section 800 feet below gage (Q-2)	Percentage Increase Q 2 - Q 1 (Q-1)
July 26th	1.17	1.68	43.6%
August 23rd	1.02	1.45	42.2%
		Mean Percentage Increase	42.9%

Under Diversions 46, 47, and 48, the estimated total flow observed in the field of the three springs contributing to the Welch and Strayer Ditch was 0.275, 0.12, and .085 cubic feet per second on June 12th, July 26th, and August 23rd, respectively. Using these values as a basis for an estimate of the water contributed by the springs and where measurements were not made at the section 800 feet below the lower gage, using 42.9% as the percentage increase of that section over the lower gage section, Table Number 15 has been prepared.

Diversions 46, 47, and 48 refer to the springs emptying into the Welch and Strayer Ditch about three quarters of a mile below its head. The diversion of the upper one, or Spring Number 1, is within the NE¼ of NW¼ Section 8, T 33 N, R 1 E. The diversions of the others (Springs Numbers 2 and 3) are within the NW¼ of NW¼ of the same Section 8.

On June 12th after inspection the total estimated flow of the three springs was 0.275 cubic foot per second, divided as follows; 0.20, 0.05, and 0.025 cubic feet per second, at Diversions 46, 47, and 48, respectively; on July 26th, after inspection, the total flow was 0.125 cubic feet per second, divided, .075 cubic feet per second at Diversion 46, and .025 cubic feet per second for each of the other two; and on August 23rd, after inspection, the estimated total flow was .085 cubic feet per second divided as follows,

0.05 cubic foot per second at Diversion 46, 0.025 cubic foot per second at Diversion 47, and 0.01 cubic foot per second at Diversion 48.

Diversions 49 and 50 both within the SW¼ of SE¼ Section 5, T 33 N, R 1 E, are the diversions of the Excelsior Ditch from Mill Creek and South Fork of Mill Creek, respectively. The interests in the ditch are O. L. Rose one-fourth, Evert G. Angle, one-fourth, Mrs. Emma Thomas, one-fourth, and J. W. and Jennie Maxwell, one-fourth. The rock and brush dam in Mill Creek diverts the flow of the creek, passing Diversion 45 of the Welch and Strayer Ditch, into the earth ditch which picks up the flow of the South Fork of Mill Creek (Diversion 50) about one thousand feet down stream. Along the next half mile length of ditch, five springs (see Diversions 51 to 55 incl.) empty into it.

About two miles below the head of the ditch, O. L. Rose, one of the four partners therein, has a lateral heading at a division box. A division board parallel to the thread of the ditch flow, divides the sectional area of the box into two unequal parts, the small part being one-fourth of the total area, turns O. L. Rose's one-quarter share of the water into his lateral. A quarter of a mile below, Mr. Rose has another lateral heading at a similar division box in the ditch. Ordinarily only one lateral is used at a time.

The total irrigated land under the Rose laterals is 7.2 acres.

About one thousand feet below Rose's lower takeout, Evert G. Angle, the second partner in the ditch, has a lateral heading at a division box constructed similarly to the one above described, except that the sectional area of the ditch side is twice the sectional area of Angle's side, thus allowing one-third of the flow to pass into Angle's lateral. About two thousand

feet farther, a small lateral takes out of the ditch to irrigate Angle's garden.

The total irrigated area under Angle's laterals was 6.8 acres and the sub-irrigated area was 2.2 acres. A small spring (see Diversion 67), irrigating 0.2 acres of land, completed Angle's use of water.

A hundred feet below the Angle garden take-out, Mrs. Emma Thomas and J. W. and Jennie Maxwell have an earth and rock division dam in the ditch which is intended to divide the remaining flow equally.

Mrs. Thomas has 23.2 acres of irrigated and 5.6 acres of sub-irrigated land under the ditch and Mr. Maxwell and his mother have 19.5 acres of irrigated land thereunder.

About three hundred feet above the first takeout in the ditch, a staff gage was installed. Five current meter measurements at this section and intermittent gage readings were used as a basis for the estimate of the flow that reached the lands under this ditch during the season. (See Table Number 16).

During the season the Excelsior Ditch diverted the total flow of Mill Creek below the Welch and Strayer diversion plus the total flow of the South Fork. The difference between the flow in Mill Creek and the flow in the Welch and Strayer Ditch at the gages on these two would be the water diverted from the Creek by the Excelsior Ditch. The difference between this amount and the amount measured in the Excelsior Ditch just below Diversion 50 would be the flow of the South Fork.

The flows so determined and current meter measurements made July 26th, August 23rd, and September 12th, are tabulated as follows:

Date	Flow in Excelsior Ditch near Rose Division Box (Gage No.4) Q 4	Estimated Flow of Springs Q 3	Flow Just Below Diversion 50 Q 2	Gain Q 4, Q 3, Q 2	Diversion from Mill Creek = Flow of Creek above Diversion 45 - Diversion 45 Q 1	Flow of South Fork, all Diverted Q 2 - Q 1
July 26th	2.40	0.25	1.84	0.31	1.23	0.61
Aug. 23rd	1.94	0.25	1.57	0.12	1.20	0.37
Sept.12th	2.88	0.25	2.54	0.09	1.80	0.74

In addition to the above data, on June 7th, current meter measurements made of the flow in the ditch just above and just below the diversion from South Fork showed 1.54 and 3.78 cubic feet per second, or a flow of 2.24 second feet for the South Fork.

It should be noted that unlike the Welch and Strayer Ditch which suffers a tremendous seepage loss in its length from Mill Creek to Oak Run Creek, the Excelsior Ditch, which follows a sidehill a little distance below the Welch and Strayer Ditch, experiences a gain of water in an approximately equal length of ditch from Mill Creek to the Oak Run Creek watershed.

Diversions 51, 52, 53, 54, and 55 refer to the five channels from springs that empty into the Excelsior Ditch. The point where the first empties into the ditch is within the SE¼ of SW¼ Section 5, T 33 N, R 1 E, the second is within the NE¼ of NW¼ Section 8, T 33 N, R 1 E, and the other three are within the NW¼ of NW¼ of the same Section 8.

On June 8th, a current meter measurement made on the Excelsior Ditch above all springs, gave 2.83 second feet, and a measurement below the springs gave 3.24 second feet. The difference (0.41 second foot) is the combined flow of the springs on this date. The estimated flow at each diversion was: Diversion 51, 0.05 second foot; Diversion 52 (sometimes called Hart's Swamp), 0.02 second foot; Diversion 53, 0.20 second foot; Diversion 54, 0.10 second foot; and Diversion 55, 0.04 second foot.

The flow of the springs diminished until the latter part of July after which they remained practically constant. The flow of the five springs estimated July 26th, August 23rd, and September 12th, were the same on each date. The estimates were as follows: Diversion 51, 0.01 second foot; Diversion 52, 0.025 second foot; Diversion 53, 0.10 second foot; Diversion 54, 0.10 second foot; Diversion 55, 0.01 second foot.

Diversion 56 within the SE¼ of SE¼ Section 7, T 33 N, R 1 E, is the diversion made by H. F. Webb of the water of a spring channel tributary to Mill Creek. An earth ditch carries the water from the brush and rock diversion dam a little more than a quarter of a mile to a gulch in the Oak Run Creek watershed into which the water is emptied, and rediverted about a thousand feet downstream. The earth ditch from the brush and rock rediversion dam is about a half mile long and irrigates 10.0 acres of land of which 4.9 acres were irrigated in 1923.

On June 8th the flow of the lower ditch just below the point of rediversion was 0.34 second foot as determined by a float measurement. The total flow of the spring was being diverted.

Diversions 57 and 58 within the NW¼ of NE¼ and the NE¼ of NW¼ Section 7, T 33 N, R 1 E, respectively, are diversions made by J. C. Hawes from seepage water tributaries of Mill Creek. The ditch below Diversion 58 here named the Orchard Ditch, is about seven hundred feet long and irrigates 1.6 acres of land.

On July 31st, the flow of the upper tributary, all diverted by Diversion 57 dam, was .023 second foot, and the flow of the lower tributary, all diverted by Diversion 58 dam, was 0.04 second foot, as determined by

float measurements.

Diversion 59 within the SE¼ of NW¼ Section 7, T 33 N, R 1 E, refers to J. C. Hawes' spreading dam put in a spring channel to spread the flow thereof over 0.6 acre of pasture. The flow of the channel, on July 31st, was estimated at .01 second foot.

Diversion 60 within the NE¼ of NW¼ Section 7, T 33 N, R 1 E, refers to the diversion of the Hawes' Garden Ditch which diverts water from a channel carrying waste water from the O. L. Rose place and water emptied into it by the Hawes' Orchard Ditch. The garden ditch is about six hundred feet long and irrigated 1.2 acres of land.

On June 8th, the flow of this channel, which was all being diverted by Diversion 60, was 0.15 second foot, as determined by float measurement.

Diversion 61 within the Lot 1 Section 7, T 33 N,R 1 E, refers to J. C. Hawes' earth spreading dam in a return water channel, from the Rose place, that spreads the water thereof over 1.1 acres of pasture lying along the channel. The flow available for this diversion on July 31st, was 0.06 second foot, measured in the Hawes' Short Garden Ditch (see Diversion 62).

Diversion 62 within the NW¼ of NW¼ Section 7, T 33 N, R 1 E, refers to the Hawes' Short Garden Ditch diversion from the same return water channel as supplies Diversion 61. The ditch is about two hundred feet long and irrigates 0.2 acre of garden. A float measurement of the flow in this ditch on July 31st, showed 0.06 second foot. The total flow of the channel was being diverted at the time.

Diversions 63 and 64 both within the NW¼ of NW¼ Section 7, T 33 N, R 1 E,

refer to diversions by J. C. Hawes from the above return water channel and from Mill Creek, respectively. The waters so diverted are co-mingled and flow through a well constructed earth ditch for a distance of about a quarter of a mile where they are returned to Mill Creek. No land is irrigated under this ditch although irrigation is proposed. A float measurement made July 31st, on the ditch from Diversion 63 when flowing full, showed 0.04 second foot of water. The flow, being diverted by the ditch from Mill Creek on June 6th as measured with a current meter, was 0.26 second foot. Water was spilling over the board and earth diversion dam so that the above flow represents the maximum amount that could be diverted without raising the dam.

Diversions 65 and 66 within the SE¼ of NE¼ Section 12, T 33 N, R 1 W. refer to dams in a channel carrying waste water from the Rose and Angle places, that turn water into two small ditches belonging to J. C. Hawes, here named South Garden Ditch and North Garden Ditch, respectively. The South Garden Ditch irrigates 0.5 acre of garden and the North Garden Ditch 0.3 acre of garden. A float measurement made July 31st of the water in the South Garden Ditch showed .07 second foot. This was the total flow of the channel and was available for either ditch.

Diversion 67 within the NE¼ of SE¼ Section 12, T 33 N, R 1 W, refers to the diversion by E. G. Angle of the water of a small spring rising just south of his orchard. The water is conducted through a small V shaped wooden trough, which empties it into a ditch about two hundred feet long. Land irrigated under this ditch amounts to 0.2 acre. On July 18th, the flow of the spring was measured in a can of known capacity and found to be .017 second foot.

Diversion 68 within the NW¼ of NW¼ Section 13, T 33 N, R 1 W, refers to the diversion by J. W. and Jennie Maxwell of water from a channel carrying waste water from Mrs. Thomas' irrigated lands. It should be noted that this channel is tributary to Oak Run Creek but this diversion is included in the North Cow Creek Report, because the total flow of the channel in the summer time is waste water from the Excelsior Ditch from the North Cow Creek watershed. The ditch is about two hundred feet long and empties into one of the Maxwell laterals from Excelsior Ditch from which lateral the water is used for the irrigation of any part of Maxwell's lands included under the Excelsior Ditch.

A float measurement made June 7th, of the flow of the channel, all being diverted showed 0.64 second foot.

Diversion 69 within the NE¼ of NE¼ Section 2, T 33 N, R 1 W, has reference to the diversion of E. J. Phillips' Mill Ditch from North Cow Creek. A rock and brush diversion dam turns water into a sidehill ditch which gains enough drop in its length of about three-eighths of a mile to operate a saw mill. About five hundred feet below the diversion, a lateral takes water from the Mill Ditch for the irrigation of 0.7 acre of pasture. A pipe line taking out about 300 feet below the above take-out, aids in the irrigation of the pasture. Still eight hundred feet farther, another lateral takes out of the Mill Ditch for the irrigation of 0.1 acre of garden. A partially buried pipe line about five hundred and fifty feed long that carries domestic water to Phillips' house, heads in the ditch about two hundred feet below the garden take-out. A short distance below the pipe head, a wooden flume carries the water to the box forebay of the 15 inch steel pipe penstock. A

bypass flume has been arranged at the head of the forebay flume. The water after passing through the water wheel, returns to North Cow Creek.

A current meter measurement was made July 6th of the flow in the Mill Ditch which showed 7.50 second feet. Mr. Phillips stated that this was the normal head used by the plant. The ditch was filled to capacity by this flow at two different places. The difference in elevation as obtained by transit survey, between the water surface in the forebay and the center line of the nozzle is 43.5 feet. With normal flow, the theoretical horsepower developed neglecting friction loss in the penstock, is 7.50 x 43.5 ÷ 8.8 = 37.1 H.P.

On July 6th, the discharge of the pipe line from the Mill Ditch to the house was measured in a bucket of known capacity. The result was 0.051 second foot.

Diversion 70 within the NW¼ of NE¼ Section 2, T 35 N, R 1 W, refers to the diversion of the E. J. Phillips Garden Ditch from North Cow Creek. A rock and brush dam turns water into a sidehill ditch which branches, about six hundred feet below its head, into (1) a short sawdust ditch that carries the sawdust from the mill to a sawdust pile then returns to the creek and, (2) a ditch about four hundred feet long that irrigates a 0.3 acre garden.

About three hundred feet below the head of the ditch, there is a short flume section at the end of which the water drops about two feet. This afforded a place for a volumetric measurement, made August 12th, of the flow of the ditch. The flow represented the normal head used according to Mr. Phillips, and filled the ditch to capacity. The measurement showed 0.29 second foot.

Diversion 71 within the SE¼ of NW¼ Section 2, T 35 N, R 1 W, is made by E. J. Phillips of the water of a wash that carries water in the Spring time. A wooden flume about one hundred and twenty feet long carries the water so diverted to the house where it is used for domestic purposes, being replaced later in the season by the water from the Mill Ditch.

On July 6th, a measurement made by filling a bucket of known capacity at the discharge end of the flume showed a flow of .014 second foot, which was the total flow of the wash.

Diversions 72 and 73 within the SE¼ of NE¼ and NE¼ of SE¼ Section 34, T 34 N, R 1 W, respectively, refer to the diversions, by A. H. Strawn, of two springs on his own property known as the Maple Spring and the Alder Spring. The waters from these springs augment Mr. Strawn's supply from the Pehrson-Grant-Strawn Ditch so that no attempt has been made to segregate the irrigated land that might be under each one.

On June 27th, float measurements, made of the flow from the two springs, showed .006 second foot for each.

Diversion 74 within the SE¼ of NW¼ of Section 34, T 34 N, R 1 W, is a diversion by Jesse Grant from a spring on his own land. At the point of diversion, a buried pipe line heads and carries water to the house for domestic use and for the irrigation of 0.2 acre of yard. Also at the point of diversion, a small ditch heads that irrigates 0.1 acre of orchard.

The flow of the spring on June 6th, as measured with a float, was .04 second foot. The flow remains practically constant throughout the season, according to the owner.

The balance of Mr. Grant's place is irrigated by the Pehrson-Grant-Strawn Ditch.

Diversion 75 within the NE¼ of SW¼ Section 34, T 34 N, R 1 W, refers to Mr. A. F. Pehrson's diversion, herein called Borquist Ditch, from the return water channel from Grant's place. This ditch is about one mile long, flowing along the highway and irrigating the lands adjacent to it. Inasmuch as the flow of this ditch is made up entirely of Pehrson-Grant-Strawn Ditch water, the lands irrigated under it have been included under the latter ditch system. Such lands amount to 7.3 acres.

A float measurement made June 6th of the flow of the ditch showed 0.21 second foot.

Diversions 76, 77, 78, 79, and 80 refer to the diversions by A. F. Pehrson of the waters of Big Spring, Indian Spring, Lake Spring, Reservoir Spring, and House Spring, respectively, all on his own land. The first is within the SE¼ of SW¼ Section 27, the second, third and fourth are all within the NE¼ of NW¼ Section 34 and the fifth is within the NW¼ of NW¼ Section 34, all of T 34 N, R 1 W. The waters from these springs except Diversion 80, all augment the supply from the Pehrson-Grant Strawn Ditch and no attempt has been made to segregate the land that might be irrigated under each one.

The waters from Big Spring and from Reservoir Spring are turned into a small fishpond of approximately 0.5 acre foot capacity. Water from the pond flows to a gulch which in turn empties the water into a branch of the Pehrson-Grant-Strawn Ditch.

Two pipe lines head at the house spring, one delivering water to the house for domestic purposes and the other delivering water to a refrigerating box on the path to the house.

Measurements made June 6th are tabulated as follows:

Pehrson's Springs

Spring	Measured Flow Second Feet	Method of Measurement	Remarks
Big Spring	0.191	Float	Max. flow of spring. Normal flow is 50% of this.
Indian Spring	0.064	Float	Max. flow of spring. Normal flow is 50% of this.
Lake Spring	0.054	Float	Max. flow of spring. Normal flow is 50% of this.
Reservoir Spring	0.013	Float	Max. flow of spring. Normal flow is 50% of this.
House Spring	0.008	Volumetric	Flow of spring is practically constant.

Diversions 81, 82, and 83 all within the SE¼ of SE¼ Section 3, T 33 N, R 1 W, refer to the diversions by U. G. Dungan from an apparently natural channel carrying water from two springs that rise seven or eight hundred feet above the first diversion. The channel has been named Dungan Gulch in this report. The upper Ditch diverts water from the gulch just after it has crossed the county road. This ditch is about eight hundred feet long and irrigates 5.2 acres of land.

Diversion 82 is the head of a ditch about one hundred feet long which supplies a buried pipe line to Dungan's house with water for domestic purposes and the irrigation of 0.30 acres of land around the house.

The Dungan Gulch Main Ditch (Diversion 83) branches at its head, one part following the south edge of Dungan's irrigated lands and the other branch flowing about three hundred feet to the head of an elevated flume, four hundred fifty feet long, across the pasture. From the flume a ditch

flows along the north edge of the irrigated lands. The Dungan Gulch Main Ditch irrigates 24.2 acres, of which 4.0 acres of pasture and meadow have been classified as being sub-irrigated.

On June 20th, a current meter measurement was made of the flow of the large spring feeding Dungan Gulch. The section chosen was about one hundred feet below the spring, in a channel which appeared to be the natural course of the spring. It was stated by Mr. Dungan that this channel had been improved artificially and was referred to by him as a ditch. If this was a ditch, the point of diversion would be at the spring and Diversions 81, 82, and 83 would be merely rediversions. The flow of the spring as measured was 0.50 second foot, which flow was described by Mr. Dungan as being 80% of the early season flow and 200% of the late summer and fall flow.

A smaller spring, flowing into the channel a short distance below, flowed .034 second foot as determined by float measurement. This was described by Mr. Dungan as being the normal flow during irrigation season.

Diversions 84, 85, and 86 all within the SW¼ of SE¼ Section 3, T 33 N, R 1 E, refers to diversions made by Mr. Dungan of the water of an unnamed wash that carries water only in the Spring time. By diverting this water, Mr. Dungan is enabled to apply one irrigation in the spring to 2.9 acres of pasture under the Upper Unnamed Wash Ditch (Diversion 84) to 0.9 acre of meadow under the Middle Unnamed Wash Ditch (Diversion 85) and to 0.9 acre of meadow under the Lower Unnamed Wash Ditch (Diversion 86). This land is not otherwise irrigated. The wash was dry during the period of investigation.

Diversion 87 within the SE¼ of SW¼ Section 3, T 33 N, R 1 W, is the head

of Mr. Dungan's ditch from Little Valley, the water for which comes from a spring a short distance above the diversion. The ditch is about three hundred feet long and serves to spread the water over 1.9 acres of pasture lying along the channel.

Mr. Dungan stated that the flow of this spring was practically constant. On June 20th it was .027 second foot as determined by float measurement.

Diversion 88 within the SE¼ of NW¼ Section 3, T 33 N, R 1 W, refers to the diversion of G. R. Eldridge's Upper Ditch from North Cow Creek. A rock and brush dam diverts the water into a ditch heading on the south side of the creek. About three hundred and fifty feet below the diversion, the ditch crosses the creek on a wooden flume eighty feet long and flows along the side of the canyon for about three-quarters of a mile. Along the next half mile of the ditch several patches of sidehill pasture have been irrigated to the extent of 11.0 acres. The ditch then follows along the upper side of Eldridge's meadow. The total irrigated acreage under this ditch, including 3.0 acres of pasture last irrigated in 1920, is 54.5 acres.

On June 26th, a current meter measurement of the normal irrigating head, as turned in by Mr. Eldridge, made just below the flume across North Cow Creek, showed 1.05 second feet. The ditch was then filled to capacity by Mr. Eldridge, and after inspection of the ditch to make sure this was the capacity, a measurement of 1.36 cubic feet per second was obtained by current meter measurement.

Diversion 89 within the NW¼ of SW¼ Section 3, T 33 N, R 1 W, is the diversion of the Ben Bibbens' Ditch from North Cow Creek. The ditch takes out on the

south side of the creek and follows the side of the canyon for about one mile to the Bibbens irrigated lands, in the SW¼ of SW¼ Section 4, T 33 N, R 1 W. From this point the water is distributed for the irrigation of 13.4 acres on the Bibbens ranch and 10.0 acres on the Wm. Eiler ranch, a total of 23.4 acres. Of this total irrigated area, 2.8 acres on the Bibbens ranch and 1.0 acre on the Eiler ranch, a total of 3.8 acres, have been classified as sub-irrigated.

On June 26th, the ditch was flowing to capacity with a head of 0.72 cubic foot per second as determined by a current meter measurement. The head was then reduced by Mr. Bibbens to the normal amount used for irrigation and a current meter measurement showed 0.59 cubic foot per second. The measurements were made about two thousand feet below the head of the ditch.

Diversion 90 within the NW¼ of SE¼ Section 4, T 33 N, R 1 W, refers to the G. P. Eldridge Lower Ditch from North Cow Creek. An earth and rock dam diverts the water into an earth ditch which flows about a quarter of a mile before reaching Eldridge's irrigated fields. The ditch irrigates 22.9 acres of land which are under the Upper Ditch but not irrigated thereby.

On June 26th, the normal irrigating head as turned in by Mr. Eldridge was found to be 0.71 cubic foot per second, determined by a current meter measurement. Using this hydraulic data together with additional data obtained in the field, the computed maximum capacity of the ditch is 0.93 cubic foot per second.

Diversion 91 within the NW¼ of SW¼ Section 4, T 33 N, R 1 W, has reference to the head of the Eldridge Island Ditch from North Cow Creek. The ditch is about two hundred feet long then ends in a swale from which the water

is rediverted as required. The ditch irrigates 1.7 acres of pasture on an island in the creek.

On June 25th, a current meter measurement was made of the flow in the ditch, which Mr. Eldridge stated to be the ordinary head used for irrigation. The result was 0.31 cubic foot per second.

Diversion 92 within the NE¼ of SE¼ Section 5, T 33 N, R 1 W, refers to the head of the Eldridge House Ditch. The ditch branches about one hundred and fifty feet below the diversion, one fork going to the barn thence into the creek, and the other going to the house for domestic purposes, thence to the garden where 1.0 acre is irrigated.

The normal head diverted as per Mr. Eldridge, was measured June 25th, with a current meter, the result being 0.23 cubic foot per second.

Diversion 93 within the NW¼ of SE¼ Section 5, T 33 N, R 1 W, is the diversion of the De Forest Hobson Upper Ditch from North Cow Creek. About three hundred feet above the diversion, the creek forks to form an island, and the flow of the south fork from which the ditch takes out, is regulated by a rock dam at the forks. At the point of diversion a rock and brush dam turns water into the earth ditch which is about one mile long, following the south edge of Mr.Hobson's cultivated land and irrigating pieces of meadow and alfalfa between the ditch and North Cow Creek. 9.9 acres are irrigated and 0.8 acre is sub-irrigated by this ditch.

On June 23rd the flow of the ditch, about three hundred feet below the diversion, as measured with a current meter, was 3.37 cubic feet per second. Mr. Hobson stated that this was the maximum head he could use for irrigating and then reduced the flow to the normal irrigating head. A meter measurement

of the latter gave 2.79 cubic feet per second, measured at the same section as above.

Diversion 94 within the SE¼ of SW¼ Section 5, T 33 N, R 1 W, is the diversion of the De Forest Hobson Lower Ditch from North Cow Creek. The diversion is affected by a board and rock dam which diverts the water into a short section cut in the rock. From this section an earth ditch follows the sidehill for about one-half mile where the ditch divides, the main part continuing on the north side of the creek and the other part crossing the creek in a wooden flume below which it irrigates 2.9 acres of garden, meadow, and orchard. About two thousand feet below the division, a short wooden flume takes water out of the main ditch and drops it 20 feet through a 10 inch steel pipe penstock for the operation of an undershot wheel, directly connected to a grindstone. The water so used then aids in the irrigation of the meadow and orchard below.

Below this takeout, the main ditch continues for more than a quarter of a mile, irrigating most of the land below it as far as the creek. The ditch ends at the Scoggins Ditch (R. A. Ward upper ditch, Diversion 99) into which any excess water is emptied to be taken out again at three different points for the irrigation of Mr. Hobsons lower alfalfa field.

The total acreage irrigated under the Hobson Lower Ditch, including the 2.9 acres, previously mentioned, is 42.8 acres irrigated and 0.4 acre of sub-irrigated pasture.

On June 23rd, at a section about four hundred feet below the diversion, a current meter measurement was made of the flow in the ditch, which filled the same to capacity. The result was 9.91 cubic feet per second.

On the same date, a current meter measurement made of the normal head used in the flume for the operation of the grindstone, gave 1.08 cubic feet per second. With this flow and the head of 20 feet, the theoretical horsepower developed would be $\frac{1.08 \times 20}{8.8} = 2.5$ horsepower.

Two days later, current meter measurements were made on the ditch at points about four hundred feet below and about thirteen hundred feet below the diversion head. The flow, so measured, was 6.07 cubic feet per second at each section. Mr. Hobson stated that the flow in the ditch then was the normal irrigating head.

Diversions 95 and 96 both within Lot Number Six of Section 6, T 33 N. R 1 W. are the De Forest Hobson diversions from two small springs, here named Orchard Springs. The waters from the small pipe lines heading at the excavated holes at the springs, come together at the corner of a 0.7 acre irrigated orchard, from which junction a ditch carries the water about two hundred feet along the upper edge of the orchard.

At the upper spring is an excavated rectangular hole, 7.0 feet long, 5.5 feet wide, and 2.5 feet deep, which Mr. Hobson stated filled in twelve hours. Using these data, the flow of the spring would be .0022 cubic foot per second.

At the lower spring, is an excavated elliptical hole of 8.5 feet major axis, 5.5 feet minor axis, and 3.0 feet depth, which Mr. Hobson stated filled in 24 hours. Using these data, the flow of the spring would be .0013 cubic foot per second.

These data was collected June, 1923.

Diversion 97 within the SE¼ of NE¼ Section 6, T 33 N, R 1 W, refers to De Forest Hobsons buried pipe line diversion from a spring about sixteen hundred and fifty feet north of this house. The water is used for domestic purposes. The pipe line heads at a basin excavated at the spring, the dimensions of which are: length 10.0 feet, width 4.5 feet, depth 4.0 feet. Mr. Hobson stated that the spring filled the basin in 36 hours. Using these data, the flow of the spring would be .0014 cubic foot per second.

These data were collected June, 1923.

Diversion 98 within Lot Number Two, Section 6, T 33 N, R 1 W, refers to the diversion by R. A. Ward of the water of a spring about two thousand feet southeast of his house. A one inch pipe line carries the water from the spring to an elevated tank which supplies domestic water. The discharge of the pipe line, as measured July 7th, in a bucket of known capacity, was .003 cubic foot per second.

Diversion 99 within the NW¼ of SE¼ Section 6, T 33 N, R 1 W, refers to the diversion of the Scoggins Ditch (R. A. Ward, owner) from North Cow Creek. A timber and rock dam about fifty feet long is built in the creek at the beginning of each irrigation season and removed in the fall. A short wooden flume carries the water from the dam to the earth ditch. About one thousand feet below the diversion, the ditch receives water from the Hobson Lower Ditch, which water is taken out at three points below for the Hobson lower alfalfa field. The ditch then follows the foothill for about a quarter of a mile at which point it divides, one branch continuing around the hill and the other crossing the

road and joining the Ward Lower Ditch.

The irrigated land under the Scoggins Ditch, that is too high to be irrigated by the Lower Ditch, amounts to 13.4 acres.

On June 22nd, a current meter measurement, taken in the flume section at the head of the ditch, showed 4.26 cubic feet per second flow. Mr. Ward stated that this was the normal irrigating head. The flume was filled to capacity by this amount of water.

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Diversion 100 within Lot Number 3, Section 6, T 33 N. R 1 W, has reference to the diversion of the Ward Lower Ditch from North Cow Creek. About two hundred feet above this diversion the creek forks to form an island. The Ward Lower Ditch diverts from the North Fork while the Red River Lumber Company Feeder Flume diverts from the South Fork. The flow of the two branches is controlled artificially by a rock dam at the forks. The Ward Lower Ditch diversion dam is built of rocks and sand bags and turns the water into an earth ditch. About three hundred feet below the diversion, the ditch is joined by a branch of the Scoggins Ditch (see Diversion 99). From here on, the water is taken out for irrigation. A little more than a quarter of a mile from the point of diversion the ditch crosses the Creek on a wooden flume, follows the hill for another quarter mile, and then is used to irrigate the lands south of the Creek.

The acreage irrigated by water from this ditch augmented by water turned in from the Scoggins Ditch, including a small garden on the island at the forks, is 48.4 acres, and an area of 0.7 acre classified as sub-irrigated, a total of 49.1 acres.

On June 22nd, 3.27 cubic feet per second was the flow measured with a current meter in the Lower Ditch at a flume section about one hundred feet below the point of diversion. This amount, which filled the ditch to capacity at a point a few feet below the flume, was stated by Mr. Ward to be the normal irrigating head.

Diversion 101 within Lot Number Four, Section 6, T 33 N, R 1 W, is the diversion from North Cow Creek of the Red River Lumber Company's flume that augments the flow of the main Red River Lumber Company's main flume from Montgomery Creek. A rock and earth dam diverts the flow of this fork of the creek, described under Diversion 100, into a V shaped wooden flume, about 2½ feet wide and 1½ feet deep. About eighteen hundred feet below the diversion, this flume empties into the main flume.

The main use of the water diverted during the season of 1923 was to keep the eighteen hundred feet of flume in repair and to augment the water of the main flume in keeping that in repair. There is about fifteen miles of wooden flume between this diversion and Bella Vista where it ends.

However, the water from the flume is used at times on the Bella Vista Lumber Company Ranch at Bella Vista for irrigation. This acreage amounting to 94.3 acres appears in Table 11 under the Cook and Butcher Ditch in which the Red River Lumber Company has a one-quarter interest, and the water of which is used on the same land as is the flume water.

On June 15th, the flow being carried by the feeder flume, as determined by current meter measurement, was 5.88 cubic feet per second. Mr. M. A. Klingler, the flume superintendent, stated that this amount was

available until about July 15th after which date, the water available was about one half this amount. This flow filled the flume to within .05 foot of the top in some places.

Diversion 102 within the SE¼ of SE¼ Section 36, T 34 N, R 2 W, is that of the Huffman Ditch (J.G.Asher, owner) from North Cow Creek. A rock and lumber dam in the creek, about one hundred feet below the mouth of Cedar Creek, turns the water into an earth ditch. The ditch follows the side of the canyon for about a half-mile before reaching the upper end of Mr. Asher's irrigated lands consisting of 9.8 acres in the upper field and 4.8 acres on the lower place, a quarter of a mile below.

On June 22nd, a current meter measurement was made of the normal irrigating head in the ditch about one-third of a mile below the diversion. The result was 2.22 cubic feet per second. The ditch was then filled to capacity by Mr. Asher and a current meter measurement showed 2.73 cubic feet per second. A flume section in the ditch about one thousand feet below the place of measurement would not accomodate the maximum flow, but the owner stated that it was only a temporary arrangement and that the conduit had been and would be made amply large.

Diversion 103 within the NE¼ of NE¼ Section 2, T 33 N, R 2 W, refers to Mr. Asher's buried pipe line that carries water from a small spring for a distance of about two hundred fifty feet to the house. A short pipe line carries the water from a spring to a sand filter barrel at the bottom of which the pipe line to the house heads. A volumetric measurement of the discharge of the upper pipe line on June 25th showed .004 cubic foot per second.

This was the total flow of the spring at the time which Mr. Asher says is practically constant.

Diversions 104 and 105 within the NE¼ of NE¼ and the SE¼ of SW¼ Section 10, T 33 N, R 2 W, respectively, refer to diversions made by the Afterthought Copper Company pumps in North Cow Creek. The first pump lifts water to a tank on the Fitzsimmons Claim, which is within Section 11, T 33 N, R 2 W, and is Afterthought Copper Company property. The tank has an inside diameter of 13.18 feet and a depth of 10.0 feet. Mr. Robert Milliken, Mine Superintendent, stated that the pump which is a 2½" by 3" Deming Triplex, raised the water in the tank 1.0 foot in 1 hour. Additional data noted; pressure gage at pump 42 pounds per square inch, suction lift, 18 feet, discharge pipe 2 inches in diameter and suction pipe 2½ inches in diameter. Using these data, the computed discharge of the pump is .038 cubic foot per second. The water is used for fire protection and the operation of a compressor. Most of the water is thus returned to the stream within the NE¼ of NE¼ Section 10, T 33 N, R 2 W.

On June 14th, a measurement was made of the discharge of the lower pump, the following data and conditions being noted: the pump, a Gould Triplex 8" by 10", operated by a 30 H. P. motor, full load speed of 850 R.P.M., was running wide open. The suction lift was 11 feet through a 6 inch suction pipe and the discharge lift through a 5 inch discharge pipe, as computed from the pressure gage reading at the pump of 115 pounds per square inch, was 265 feet. The water is discharged into a flume across the tops of two tanks into which the flume empties.

The tanks each had an inside diameter of 23.60 feet and the time

required to raise the water level 0.50 feet in each tank was 13 minutes and 24 seconds. Using these data, the discharge was 0.55 cubic foot per second.

The water is used at the mill within the NW¼ of NE¼ and NE¼ of NW¼ Section 15, T 35 N, R 2 W, and for municipal use in the town of Ingot in the SE¼ of SW¼ and SW¼ of SE¼ Section 10, T 35 N, R 2 W.

Diversion 106 within the NW¼ of NE¼ Section 31, T 35 N, R 2 W, refers to the diversion of the Eliza Wilsey Ditch from North Cow Creek. A concrete dam, about one hundred feet long, with the aid of flashboards, diverts the water into a dirt sidehill ditch on the north side of the creek. About three-eighths of a mile below the diversion, the ditch divides, one part following along the foothills on the north side of the creek, and the other crossing the creek on a wooden flume and following the base of the hills to the south of the creek. About one half mile below this branch, the north side ditch enters Mrs. Wilsey's irrigated land where 20.2 acres are irrigated.

The ditch continues onto Mr. George Rutherfords land, having irrigated 6.9 acres there until 1920, subsequent to which date no water has been used on this acreage owing to scarcity.

About a quarter of a mile below the flume across the creek, the south side ditch enters the irrigated fields where 25.0 acres of land were irrigated until 1920, but since then no water has been used on this side of the creek, owing to shortage.

Some years ago the south side branch was continued on to Mr. George Rutherfords property south of the creek. Mr. Rutherford, however, was enjoined by lower users from using any water through this

branch, which would irrigate 29.0 acres of his land, all of which has been irrigated by water from the Red River Lumber Company flume about one quarter of a mile south, but to which use probably no right obtains.

On June 21st, a current meter measurement made of the flow in the ditch at a flume section about four hundred feet below the point of diversion, showed 1.15 cubic feet per second. Mr. Roy E. Wilsey stated that this was the normal head used for irrigating. This flow filled the ditch, which had not been cleaned and repaired this year, to capacity.

When the ditch is in repair, Mr. Wilsey stated that the flume section in which the measurement was made, limits the ditch capacity. In this case, the water would be 0.15 feet deeper than when measured. Using hydraulic elements from the current meter measurement and the increased depth, the computed maximum capacity is 1.64 cubic feet per second.

Diversion 107 ✓ within the NW¼ of SE¼ Section 36, T 33 N, R 3 W, M.D.M., refers to the diversion of the Woodman Ditch from North Cow Creek, owned by Charles L. Lemm. A timber dam about seventy-five feet long raises the water in the creek into a wooden diverting flume about forty feet long. The water is then carried by a large earth ditch for about three quarters of a mile before reaching Mr. Lemms irrigated lands. During the season 1923, the ditch irrigated 79.2 acres of land, while during the past few seasons, 28.0 acres of additional land have been irrigated, making a total of 107.2 acres.

At several points in the ditch water is turned out into swales draining toward the creek. In this way considerable land is kept green for pasture, the area of which has been included in the above acreage.

In 1923 water was turned into the ditch about July 2nd, and the irrigation season continued until the fall rains began, September 22nd. A staff gage was installed in the ditch about sixty feet below the diversion. An estimate of the total amount of water used during the season has been prepared, based on eight current meter measurements and gage readings by Mr. Lemm and by the Field Engineer, and is herewith submitted as Table Number 17.

On July 2nd the owner filled the ditch to maximum capacity. After a thorough inspection to see that no water spilled over at any point in the ditch above the first takeout, a current meter measurement of the flow was made. The amount of water being carried was 11.80 cubic feet per second.

Diversion 108 within the NW¼ of SE¼ Section 6, T 33 N, R 3 W, M.D.M. refers to Mr. George Rutherford's diversion by pump of the water in a slough or hole about one hundred feet north of the creek. The water is lifted to a short wooden flume which empties into the distributing ditches in the field. An area of 2.9 acres is irrigated.

The pump is a 3" centrifugal with 4" suction pipe. The suction lift is 9 feet, and the discharge lift 4 feet. On June 21st a current meter measurement was made of the water being discharged by the pump. The result was 0.56 cubic foot per second.

It was noted that this rate of discharge would pump the hole dry in a few mimutes. The hole would then be allowed to fill again, requiring probably a day or two, when the pump would again be started and the process repeated.

Diversion 109 within the NW¼ of NW¼ Section 2, T 32 N, R 3 W, M.D.M., has reference to Mr. John Rutherford's pump in North Cow Creek. The water is

lifted to a short wooden flume which empties into an earth distributing ditch.

The acreage irrigated during 1923 was 7.3 acres and the additional acreage irrigated during recent years was 11.5 acres, making a total of 18.8 acres irrigated under this installation.

The pump is a 10" Krough Centrifugal with a 12" suction pipe. Suction lift is 9 feet and discharge head 5 feet. It is driven by a 20 H.P. Alamo Gasoline Engine. On June 21st a current meter measurement of the discharge showed 3.64 cubic feet per second.

√

Diversion 110 within the NE¼ of SW¼ Section 9, T 32 N, R 3 W, M.D.M., is the diversion of the Cook and Butcher Ditch from North Cow Creek. A concrete dam about 90 feet long diverts the flow into a short section of concrete flume. The flume empties into the earth ditch. About one mile below the diversion the ditch enters the Bella Vista Lumber Company farm and is crossed by a flume in the ditch from the Red River Lumber Company Flume. At this crossing, the water of the Red River Lumber Company Flume ditch can be turned into the Cook and Butcher Ditch, or water from the latter can be turned into the Red River Lumber Company Flume ditch just below the crossing of the two.

Interests in the ditch are: Red River Lumber Company, one-eighth, Estate of P.W.P. Stanford, Luella Lofton, Administratrix, one-eighth, J. G. Chatham, one-eighth, J. F. Fitzpatrick, two-eights, Olson Brothers, two-eights, and L. J. Sharpe, one-eighth.

In 1923 the Bella Vista Lumber Company irrigated 13.6 acres of its farm, while in recent years an additional 80.7 acres has been irrigated, making a total of 94.3 acres. All of this acreage can be and is irrigated by water from the Cook and Butcher Ditch of the Red River Lumber Company Flume.

A little more than a mile below the crossing of the lumber companys flume, Mrs. Luella Lofton, administratrix for the Stanford Estate, takes water from the Cook and Butcher Ditch. Her land irrigated under the ditch totaled 2.8 acres.

Adjoining the above ranch is J. G. Chathams place, irrigating under the Cook and Butcher Ditch, 18.0 acres of land.

J. Fitzpatrick, whose farm adjoins the Chatham place, is the next lower user and has 33.5 acres of land irrigated in 1923 and 5.5 acres of land irrigated in recent years, a total of 39.0 acres all under the Cook and Butcher Ditch.

Olson Brothers and L. J. Sharpe, irrigating 45.8 acres and 8.2 acres, respectively, are the other two users of the Cook and Butcher Ditch, making a total irrigated acreage in recent years of 208.1 acres under this system. A staff gage was installed on the ditch about three hundred feet below its diversion. Seven current meter measurements of the flow at the gage, together with numerous gage readings, were used as a basis for the estimate of the total amount of water diverted by the Cook and Butcher Ditch during the 1923 season. The estimate is submitted as Table Number 16.

Before drawing any conclusions from this estimate, it should be noted that on August 9th and 10th, water was secured from the Red River Lumber Company Flume of which no record was obtained, and that during the first

week of September, when water was most needed, little or none was available in the creek.

Below the Sharpe place the ditch becomes a swale, winding through the flat land for about one and one-half miles, and then emptying into North Cow Creek a little below the Boyle pump.

A staff gage was installed on this return water channel, at the I. N. Stanford place about one-half mile below Sharpes irrigated land.

One float measurement was made of the flow in this channel and gage readings were taken during the season. Up to June 29th, the maximum amount of water at any time was 0.4 cubic foot per second. After that date no water except some standing in pools, was observed until September 22nd when fall rains ended the irrigation season.

In 1916 the U. S. G. S. made two measurements of the water diverted by the Cook and Butcher Ditch as follows:

Date	Place	Discharge Second Feet
August 18th	200 feet below intake	6.3
Sept. 18th	200 feet below intake	0.8

Diversion 111 within the SE¼ of NE¼ Section 20, T 32 N, R 3 W, refers to the diversion of the Lizzie A. Gray Ditch from North Cow Creek. A rock and brush dam about one hundred feet long turns water into an earth ditch which follows the foothills for about one-half mile and then reaches the head of Gray's irrigated land.

The acreage irrigated under the ditch was 9.2 acres in 1923 besides 5.5 acres irrigated during recent years, making a total of 14.7 acres. Below

this land the ditch has been extended for about one mile to cover land proposed to be irrigated but which is not cultivated and has not yet had water on it.

On October 10th an inspection of the ditch was made to find the section limiting the capacity thereof. The dimensions at the section chosen were: width at top 4.0 feet, width at bottom 1.5 feet, depth 2.0 feet, and slope as stated by Mr. Gray, 1.0 foot per mile. With these data and using n = .025, the computed capacity is 4.15 cubic feet per second.

Diversion 112 within the SE¼ of NE¼ Section 29, T 32 N, R 3 W, has reference to Mrs. Lizzie A. Grey's pump in North Cow Creek. The water is lifted to a short wooden flume, emptying into a ditch which irrigated 3.4 acres of garden lying along the creek in 1922, and an additional 1.6 acres of garden in 1918 as per the owner.

On June 18th a visit was made to the pump and the following data was taken. The pump is a 4" centrifugal, operated by a 6 H.P. Witte gasoline engine, suction and discharge pipes each 5" with 8 feet and 12 feet lifts, respectively. The rated capacity of such an installation is about 1.0 cubic foot per second.

Diversion 113 within the SW¼ of SE¼ Section 29, T 32 N, R 3 W, refers to the pump in North Cow Creek owned by R. E. Starkey early in the season but later owned by Lizzie A. Gray. The acreage irrigated under the pump was 2.4 acres.

The pump is a 3½" centrifugal, driven by a 6 H.P. Fairbanks-Morse gasoline engine. The suction and discharge pipes are each 4" with 10 feet and 6 feet lifts, respectively. The rated capacity of the installation is

about 0.75 cubic foot per second. These data were observed June 18th.

Diversion 114 within the SW¼ of NE¼ Section 32, T 32 N, R 3 W, M.D.M., refers to George J. Boyle's pump in North Cow Creek. The water is lifted to a short pipe line and flume and is then emptied into the distributing ditches. The irrigated land under the pump was 12.2 acres, including 10.9 acres irrigated in 1923 and 1.3 acres irrigated in recent years.

On June 18th a current meter measurement was made of the discharge of the pump which filled the flume to capacity. The flow was 0.71 cubic foot per second. Mr. Boyle stated that the pump would throw more water and that he intended to increase the size of the flume to accomodate the full discharge of the pump. The pump is a 4" Dow centrifugal, driven by a 5 H.P. Wagner electric motor. The suction and discharge pipes are each 4½" with a 6½ feet and 12 feet lift, respectively. The rated capacity of the installation is about 1.0 cubic foot per second.

Diversion 115 within the SW¼ of SE¼ Section 32, T 32 N, R 3 W, refers to W. A. Rogue's pump in North Cow Creek. The water is lifted into an elevated pipe line which discharges into a main ditch. The acreage irrigated was 11.1 acres.

On June 18th the metered discharge of the pump was 0.72 cubic foot per second. The pump is a 3" Dow centrifugal, operated by a 5 H. P. General Electric Motor of 1800 R.P.M. rated speed. The suction and discharge lifts are each 10 feet through 3" pipes. The rated capacity of the installation is about 0.70 cubic foot per second.

Diversion 116 within the SW¼ of NE¼ Section 5, T 31 N, R 3 W, refers to

H. H. Batzbach pump in North Cow Creek. The pump was not operated in 1923. The acreage irrigated in recent years is 15.5 acres.

The pump is a 4" centrifugal, operated by a 5 H. P. Fairbanks-Morse electric motor of 1800 R.P.M. rated speed. The suction lift is 8 feet through a 5" pipe. These data were observed June 18th. The rated capacity of the installation is about 1.0 cubic foot per second.

DUTY OF WATER

The data available on the water diverted, seepage losses, and acreage irrigated, are sufficient to make possible some conclusion as to the duty of water in different sections of the North Cow Creek watershed.

Ordinarily, in this section, the irrigation season begins between May 1st and May 15th, but owing to late rains in the spring of 1923, few ranches began to irrigate before the first part of June, and in fact, no water was turned into the Woodman Ditch until the first part of July. So that for the purposes of the duty of water study no attempt was made to estimate the amount of water used prior to the date of beginning the record, the season being considered as starting on that date and ending September 22nd when fall rains made further irrigation unnecessary.

Welch and Strayer Ditch

The problem of the Welch and Strayer Ditch is the most complicated, in that the area served is all within the Oak Run Creek watershed, while the water for the irrigation thereof is brought from three different sources towit; Mill Creek in the North Cow Creek watershed, Oak Run Creek and Clover Creek.

The estimated total diversion for the season June 12th to September 22nd of the Welch and Strayer Ditch from Oak Run Creek (which includes the water diverted from Mill Creek) was 443 acre feet. The estimated total amount brought to the Oak Run Creek watershed from Clover Creek was 219 acre feet, of which the Oak Run Creek users involved were entitled to one-half or 110 acre feet (see Oak Run Creek Report). This makes a total of 553 acre feet used on 126.1 acres, including 11.8 acres of sub-irrigated land during the irrigating season of 103 days or 4.38 acre feet per acre or 1 cubic foot per second per 47.1 acres of land irrigated If the loss in the Welch and Strayer Ditch between the point of diversion from Mill Creek and the point where the water is emptied into Oak Run Creek is added to the above 553 acre feet, the gross duty would be 774 acre feet for 126.1 acres or 6.13 acre feet per acre.

Excelsior Ditch

Table Number 16 is an estimate of the water brought by the Excelsior Ditch to the lands irrigated under it. The acreage irrigated during the season of 102 days by this 498 acre feet of water was 63.5 acres, including 7.8 acres sub-irrigated. The use was therefore 7.85 acre feet per acre or 1 cubic foot per second per 25.8 acres of irrigated land.

Albert S. Patton Ditch System

As explained under Diversions Numbers 1, 2, and 3, Mr. Patton uses all the water of two springs of practically constant flow rising east of his place. On June 15th the flow of these springs were measured and found to be 0.79 cubic foot per second, and 0.19 cubic foot per second, or a total of 0.98 cubic foot per second. The total acreage irrigated by Mr. Patton during the season, including 4.1 acres of sub-irrigated land and some 32 acres of pasture

land probably only irrigated once, was 90.6 acres. Using a constant flow of 0.98 cubic foot per second for the season of 103 days, the gross use of water would be 2.21 acre feet per acre or 1 cubic foot per second per 92.5 acres irrigated. Omitting the 32 acres of uncultivated pasture land probably only irrigated once, the figures would be 3.42 acre feet per acre or 1 cubic foot per second per 59.8 acres irrigated.

Pehrson - Grant - Strawn Ditch

Although no record was kept of the flow of this ditch, it is usually kept full during the irrigation season, according to the owners and other users in the vicinity. The measured flow of 5.42 cubic feet per second on July 11th filled the ditch. Adding to this figure, .002 cubic foot per second for the Strawn Alder Spring, .006 cubic foot per second for the Strawn Maple Spring, .098 cubic foot per second for Pehrson's Big Spring, .032 cubic foot per second for his Indian Spring, .027 cubic foot per second for his Lake Spring, and .006 cubic foot per second for his Reservoir Spring, the probable flow of the several springs on the Strawn and Pehrson places, the resulting total flow applied to the lands is 5.59 cubic feet per second. The area irrigated during 1923, including 2.3 acres of sub-irrigated land, was 115.3 acres. For the irrigation season of 103 days the above figures would give a gross use of 9.89 acre feet per acre or 1 cubic foot per second per 20.6 acres of irrigated land.

Charles L. Lemm System

The Woodman Ditch, supplying water for the Lemm ranch, is the largest

ditch and heaviest user of water from North Cow Creek. Water was not turned into the ditch in 1923 until about July 2nd and the season ended September 22nd, making the period of use 83 days in duration.

The total diversion by the Woodman Ditch, as shown in Table Number 17, was 972 acre feet. The acreage irrigated was 79.2 acres. Using these figures, the gross use was 12.3 acre feet per acre or 1 cubic foot per second per 13.4 acres.

Owing to the method of irrigation, there is considerable return water to the creek. Since with the exception of this return water, there is no water put into or taken from the creek, except the two pumping installations of George and John Rutherford, respectively, between the Woodman Ditch and the Cook and Butcher Ditch diversions, it is possible to make an estimate of what the return flow amounted to in 1923.

As will be observed in the Table on page 2, the estimated flow of the creek below the Woodman Ditch dam was 0.75 cubic foot per second July 27th and 0.50 cubic foot per second August 25th. Assuming a mean value of 0.60 cubic foot per second for the 83 day season, the total flow passing the dam was 98 acre feet. The estimated flow passing the Cook and Butcher Ditch dam on August 25th was 0.75 cubic foot per second, but there was no water passing this dam later in the season. For the purpose of this estimate, it will be assumed that the water passing this dam was negligible.

As outlined in Table Number 18, the total diversion of the Cook and Butcher Ditch for the season was 806 acre feet; 225 acre feet of which was diverted prior to July 2nd, making a net diversion of 581 acre feet for the 83 day period under consideration.

Neglecting the relatively small quantity that may have been pumped from the creek by the Rutherford pumps, there follows:

The total quantity of water available at the Woodman Ditch dam was 972 plus 98 or 1070 acre feet. The total available at the Cook and Butcher Ditch dam for the same period was 581 acre feet, making a total net use by the Woodman Ditch of 1070 less 581 or 489 acre feet. Using this figure the net use on the Lemm place was 6.18 acre feet per acre or 1 cubic foot per second per 26.6 acres.

Cook and Butcher Ditch System

As noted under the discussion of Diversion Number 110, the diversion of the Cook and Butcher Ditch, a duty of water study based on the 1923 records is incomplete in that on August 9th and 10th outside water was obtained, of which no record was kept, and during the time of greatest need, early in September, no water was available. However, the following figures are presented:

The total water diverted during the 101 day season as per Table Number 18 was 806 acre feet, which was used for the irrigation of 116.8 acres. This amounts to 6.9 acre feet per acre or 1 cubic foot per second per 29.0 acres.

Net use of the Eldridge, Bibbens, Hobson, Ward and Asher Ranches

Records and observations obtained during the month of August, 1923, are here used to make a rough estimate of the net use of water by the above five ranches, all lying along North Cow Creek in the floor of the canyon.

The estimated run-off of North Cow Creek at Phillips Bridge above the diversions of any of these ranches was 415 acre feet. The measured flow of the springs feeding Dungen Gulch was 0.54 second foot on June 20th. Assuming that

the flow reaching North Cow Creek during August from this gulch was about 0.50 cubic foot per second, which would allow for Dungan waste water, his Big Valley Spring and any seepage water that might pick up below his place, the run-off from this source would be 31 acre feet. The estimated flow of Strawn gulch on July 21st was 1.5 cubic feet per second. Assuming that this was the flow during August (it may have been less but probably not more) the run-off would be 92 acre feet.

In addition to the above, float measurements were made on June 26th of the flow of two springs on Oscar Barnes' place which reach North Cow Creek on the Eldridge place. The measurements showed .087 and .022 cubic feet per second, respectively. Assuming that this flow of water reached the creek during August, the run-off would be 6 acre feet.

The total water available for the five ranches was then 415 plus 31, plus 92, plus 6, or 544 acre feet.

The run-off of North Cow Creek at Asher's Ranch below the five ranches, was 484 acre feet from which should be deducted the flow of Cedar Creek at its mouth which was 164 acre feet, leaving an unused 320 acre feet of the 544 acre feet available.

The total acreage irrigated by these five users, including 5.7 acres of sub-irrigated land, was 227.6 acres. Using this figure together with the figure for the net water used, 544 less 320 or 224 acre feet, the estimated use was 0.98 acre foot per acre for the 31 days in August or 1 cubic foot per second per 62.2 acres.

The month of August was chosen as a typical irrigation month because firstly, there was no rain, and secondly the diversion of the Red River Lumber Company feeder at Ward's ranch was negligible during this period, thus simplifying the conditions.

METHODS OF IRRIGATION

Lands devoted to alfalfa and hay are generally irrigated by the wild flooding method. The orchards and gardens are irrigated by the furrow method.

The irrigation season normally commences in April or May and ends in September or October.

TABLES

TABLE 1.

RUN-OFF RECORDS OF UNITED STATES GEOLOGICAL SURVEY

DAILY DISCHARGE, in Second Feet, of LITTLE COW CREEK at Palo Cedro, for the year ending September 30, 1911

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1												5.0
2												8.0
3												5.0
4												5.0
5												6.5
6												6.5
7												6.5
8												6.0
9											8.0	8.0
10											9.5	9.5
11											8.0	9.5
12											5.0	8.0
13											7.4	9.5
14											4.6	9.5
15											5.0	8.0
16											8.0	8.0
17											8.0	8.0
18											8.0	6.5
19											8.0	6.5
20											8.0	5.0
21											5.0	8.0
22											9.5	9.5
23											6.5	8.0
24											8.0	8.0
25											8.0	11.0
26											6.5	13.0
27											6.5	15.0
28											8.0	13.0
29											8.0	13.0
30											8.0	9.5
31											6.5	
Tot.Sec. Ft.Days:											168.0	254.4
Mean Sec.Ft.:											7.3	8.48
Total AC.FT.:											333.0	505

TABLE 2.

RUN-OFF RECORDS OF UNITED STATES GEOLOGICAL SURVEY

DAILY DISCHARGE, in Second Feet, of LITTLE COW CREEK at Pale Cedro, for the year ending September 30, 1913.

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	
1	5	18	49	150	248	100	182	146	59	38	12	7	
2	5	18	38	74	248	114	182	114	54	38	12	7	
3	5	18	41	63	202	114	182	114	50	38	7	7	
4	5	33	38	74	164	114	625	100	46	38	3	7	
5	5	33	38	53	164	100	505	100	46	38	3	12	
6	5	4480	38	150	164	100	465	114	46	34	7	12	
7	6	780	38	53	164	100	302	130	46	31	7	12	
8	6	244	31	53	164	100	248	130	46	24	3	7	
9	6	231	38	53	146	100	224	224	46	24	3	7	
10	6	398	38	53	138	100	224	164	46	24	3	7	
11	7	244	31	53	146	100	182	156	38	18	7	7	
12	6	171	38	53	130	100	182	146	38	18	7	7	
13	6	131	38	1080	114	100	202	130	38	18	7	7	
14	7	398	38	2830	114	100	182	122	38	15	7	7	
15	8	398	594	2340	114	93	302	100	38	12	7	7	
16	7	171	2610	1670	130	86	182	100	31	12	7	7	
17	6	131	1080	1360	114	100	182	100	31	7	7	7	
18	6	131	830	3800	114	378	274	100	31	7	7	7	
19	5	74	244	1170	107	362	202	114	28	3	3	7	
20	6	131	150	910	107	248	182	100	31	3	7	7	
21	6	74	131	465	100	670	182	100	31	3	7	7	
22	6	63	98	505	100	1770	164	114	31	2	7	7	
23	8	63	86	362	100	1010	173	114	38	7	7	7	
24	13	63	86	274	155	465	173	114	38	12	7	7	
25	15	63	74	302	100	362	182	86	38	12	7	7	
26	37	53	63	332	114	248	182	93	46	12	3	7	
27	23	53	63	332	114	224	182	86	69	12	3	7	
28	20	53	53	302	114	202	173	86	38	12	3	7	
29	20	49	53	274		248	155	86	46	7	3	7	
30	26	41	63	248		202	146	74	46	12	7	7	
31	20		86	248		192		74		12	7		
Tot.Sec: Ft.Days:	312	9808	6896	19686	3889	8802	6923	3530	1248	543	167	225	Period
Mean Sec.Ft.:	10.1	294	222	636	139	268	231	114	41.6	17.5	6.0	7.5	
Total ac.ft.:	621	17500	13600	39000	7720	16500	13700	7010	2480	1080	369	446	120026

TABLE 2

RUN-OFF RECORDS OF UNITED STATES GEOLOGICAL SURVEY

DAILY DISCHARGE, in Second Feet, of LITTLE COW CREEK at Palo Cedro, for the year ending September 30, 1912.

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
1	11	20	20	26	128	80	98	437	162	13	3	2
2	13	18	23	33	98	80	80	316	98	13	3	1
3	15	20	23	20	80	51	64	269	98	11	4	3
4	15	20	23	20	89	58	64	226	98	11	4	5
5	15	18	23	26	64	128	64	186	72	11	3	5
6	15	20	20	28	64	1390	58	162	51	11	3	26
7	13	20	26	33	64	606	51	162	51	8	4	226
8	13	20	20	40	900	476	51	162	51	14	5	41
9	15	20	23	332	437	332	51	139	41	5	5	26
10	18	20	23	240	1050	269	64	162	37	5	4	20
11	18	23	20	332	400	199	300	162	37	4	4	20
12	18	23	20	212	269	1000	332	118	41	5	4	20
13	18	23	20	240	240	1270	240	118	226	6.5	4	15
14	18	23	20	240	212	606	186	118	41	3	5	15
15	15	26	20	118	199	518	162	80	33	5	4	13
16	15	33	23	118	162	900	128	80	37	5	4	12
17	15	33	23	139	186	606	108	80	41	3	4	11
18	15	26	20	332	476	437	80	80	33	3	5	9.5
19	15	23	26	606	316	352	80	72	18	3	5	8.6
20	15	20	26	240	186	212	80	89	15	4	4	8
21	15	20	26	139	186	186	80	80	15	3	4	8
22	15	23	26	89	139	162	64	300	15	3	3	8
23	15	23	26	89	118	162	64	653	18	3	3	8
24	15	20	26	365	102	139	64	240	41	3	3	8
25	20	20	20	2030	80	139	80	240	20	3	3	8
26	18	20	20	1210	80	118	80	497	26	4	2	6.5
27	15	23	20	1330	89	118	80	497	20	4	2	5
28	15	23	20	476	64	89	80	332	20	5	1	5
29	18	20	26	300	64	80	240	240	15	5	1	5
30	20	23	26	186		98	400	186	11	3	1	5
31	20		26	162		72		186		3	1.2	
Total Sec Ft.Days	491	664	704	9751	6542	10913	3573	6669	1482	182.5	105.2	553.6
Mean Sec.Ft.	15.8	22.1	22.7	315	226	352	119	215	49.4	5.9	3.4	18.5
Total Ac.Ft.	972	1320	1400	19400	13000	21600	7080	13200	2940	362	208	1100

Period 82582

TABLE 4

RUN-OFF RECORDS OF UNITED STATES GEOLOGICAL SURVEY

DAILY DISCHARGE, in Second Feet, of LITTLE COW CREEK at Palo Cedro, for the year ending December 31, 1913

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1										7		164
2										7	12	
3												164
4										7		
5											12	54
6											302	
7										7		
8												
9											100	
10										3		
11										3	54	
12										7		
13												
14										7		
15											130	114
16											146	
17												
18										7		
19											54	
20												100
21												
22										7	74	715
23										7		
24											100	
25										7		3150
26											164	
27												
28											202	3150
29												
30												
31												

No records after December 29th. Station discontinued January 31st, 1914.

TABLE 5

RUN-OFF RECORDS OF DIVISION OF WATER RIGHTS

DAILY DISCHARGE, in Second Feet, of CEDAR CREEK at Ward's Bridge, for the year ending December 31st, 1923

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1							*10.2	*4.4	*1.5			
2							9.2	*4.4	*1.4			
3							* 8.8	4.4	1.3			
4							* 8.5	4.6	*1.2			
5							* 8.1	*4.4	*1.1			
6							* 7.7	*4.2	*1.0			
7							7.4	*4.0	*1.0			
8							* 6.7	*3.8	*1.0			
9							* 6.0	*3.6	*0.9			
10							5.2	*3.4	*0.8			
11							* 5.0	*3.2	0.7			
12							* 4.9	3.0	*0.6	4.6		
13							* 4.7	*2.5	0.5			
14							4.6	1.9	*0.5			
15							* 4.6	*1.9	*0.5			
16							* 4.6	*1.9	*0.5			
17							* 4.6	*1.9	*0.5			
18							* 4.6	*1.9	*0.5			
19							* 4.6	1.9	*0.5			
20							* 4.6	*1.9	*0.5			
21							4.6	*1.9	*0.5			
22						10.3	* 4.6	*1.9	Rain 3.0			
23						65.0	* 4.6	*1.9				
24						80.0	* 4.6	*1.9				
25						21.7	* 4.6	1.9				
26						15.7	* 4.6	1.9				
27						15.7	4.6	*1.8				
28						13.0	* 4.6	*1.7				
29						*12.0	* 4.5	*1.6				
30						*11.1	* 4.5	*1.6				
31							* 4.5	*1.6				
Tot.Sec. Ft.Days:						244.5	174.9	82.9	17.0			
Mean Sec.Ft.:						27.17	5.64	2.67	0.77			
Total Ac.Ft.						485	346	164	34			

Discharges obtained by applying gage heights to rating curve.
Record subsequent to September 22nd (end of irrigation season) not used.
*Interpolated.

Period 1029

TABLE 6

ESTIMATE OF RUN-OFF OF MILL CREEK ABOVE DIVERSIONS

Date	Measured Flow In Second Feet	Mean Flow Second Feet	Days	Total Second Foot Days
June 12	4.7			
		4.70	5	23.5
June 16	4.7			
		4.85	10	48.5
June 26	5.0			
		4.75	12	57.0
July 8	4.5			
		4.30	4	17.2
July 12	4.1			
		3.90	14	54.6
July 26	3.7			
		3.90	2	7.8
July 28	4.1			
		3.90	22	85.8
Aug. 19	3.7			
		3.55	4	14.2
Aug. 23	3.4			
		3.55	7	24.8
Aug. 30	3.7			
		3.55	12	42.6
Sept.11	3.4			
		3.30	1	3.3
Sept.12	3.2			
Total Days			93	
Gross Run-off in Second Foot Days				379.3
Gross Run-off in Acre Feet				751

Discharge obtained by applying gage heights to rating curve

TABLE 7

ESTIMATED RUN-OFF OF MILL CREEK INTO NORTH COW CREEK

Date	Measured Flow In Second Feet	Mean Flow Second Feet	Days	Total Second Foot Days
July 7	2.2			
		1.95	15	29.2
July 21	1.7			
		1.40	22	30.8
Aug. 12	1.1			
		0.90	12	10.8
Aug. 24	0.7			
		0.65	21	13.6
Sept. 14	0.6			
Total Days			70	
Gross Run-off in Second Foot Days				84.4
Gross Run-off in Acre Feet				167

Discharges obtained by applying gage heights to rating curve

TABLE 8

RUN-OFF RECORDS OF DIVISION OF WATER RIGHTS

DAILY DISCHARGE, in Second Feet, of NORTH COW CREEK at Phillips Mill Bridge, for the year ending December 31,192

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1							17.2	*6.9	*6.5			
2							16.6	*6.9	*6.5			
3							*16.1	*7.0	*6.6			
4							*15.6	7.0	*6.7			
5							*15.1	*7.0	*6.7			
6							14.6	*7.1	*6.8			
7							15.3	*7.1	*6.8			
8							*12.9	*7.2	*6.9			
9							*10.4	*7.2	*6.9			
10							8.0	*7.3	*7.0			
11							* 8.6	*7.3	*7.0			
12							9.1	7.4	7.0	9.9		
13							* 8.2	*7.3	*6.7			
14							7.2	*7.1	6.3			
15							7.2	*7.0	*6.3			
16							* 7.1	*6.9	*6.3			
17							* 7.0	*6.8	*6.4			
18							* 6.9	6.6	*6.4			
19							* 6.8	*6.6	*6.5			
20						19.5	* 6.7	*6.5	*6.5			
21						21.2	6.6	*6.4	*6.5			
22						24.5	* 6.8	*6.3	*6.6			
23						110.0	* 6.6	*6.2	6.6			
24						38.0	* 6.6	6.2	Rains			
25						26.8	* 6.7	*6.2				
26						25.5	* 6.7	*6.2				
27						24.5	* 6.7	*6.3				
28						21.3	* 6.8	*6.3				
29						19.0	* 6.8	*6.4				
30						17.2	* 6.8	*6.4				
31							* 6.9	*6.4				
Tot.Sec. Ft.Days						347.5	290.4	209.5	152.5			
Mean Sec.Ft.						31.6	9.37	6.76	6.63			
Total Ac.Ft.						688	577	415	302			

Discharges obtained by applying gage heights to rating curve.
*Interpolated.

Period 1982

TABLE 9

RUN-OFF RECORDS OF DIVISION OF WATER RIGHTS

DAILY DISCHARGE, in Second Feet, of NORTH COW CREEK at Asher's Ranch, for the year ending December 31, 1923

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1							*30.1	7.2	*7.2			
2							*27.6	7.2	*7.2			
3							25.2	7.2	7.2			
4							23.5	5.8	7.2			
5							23.5	7.2	*6.4			
6							*21.4	9.0	*5.6			
7							19.2	9.0	*4.8			
8							*19.2	10.2	4.0			
9							19.2	11.0	*4.0			
10							19.2	7.5	*4.0			
11							*16.6	* 8.0	4.0			
12							14.1	8.5	*2.9			
13							14.1	7.2	1.8			
14							12.5	11.0	*2.9			
15							12.8	11.0	4.0			
16							14.2	9.0	*5.0			
17							14.2	7.2	*5.1			
18							14.2	7.2	7.2			
19							*12.1	9.0	7.2			
20							10.0	7.2	*7.2			
21							11.1	7.2	*7.2			
22							*11.6	7.2(Rain	10.2			
23							12.0	7.2				
24							11.0	7.2				
25						47.5	11.0	6.8				
26						43.1	11.0	6.5				
27						41.5	11.0	7.2				
28						38.0	11.0	*7.2				
29						36.2	11.0	7.2				
30						32.5	* 9.1	*7.2				
31							7.2	7.2				
Tot.Sec. Ft.Days						235.8	479.9	244.7	123.3			
Mean Sec.Fts.						39.3	15.5	7.9	5.6			
Total Ac.Ft.						468	952	485	224			

Period 2129

Discharge obtained by applying gage heights to rating curve.
Record subsequent to September 22nd (End of irrigation season) not used.
*Interpolated.

RUN-OFF RECORDS OF DIVISION OF WATER RIGHTS

DAILY DISCHARGE, in Second Feet of NORTH COW CREEK below all Diversions, for the year ending December 31, 1923

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1							23.8	0.4	0.4			
2							15.4	0.9	0.1			
3							13.0	0.9	0.1			
4							11.0	0.9	0.1			
5							9.4	0.9	0.1			
6							11.0	0.9	0.1			
7							11.0	0.4	0.1			
8							9.4	0.4	0.1			
9							9.4	0.9	0.1			
10							7.8	0.4	0.1			
11							7.8	0.9	0.1			
12							6.4	0.9	0.1			
13							5.2	1.6	0.1			
14							4.2	3.2	0.1			
15							4.2	0.9	0.1	*15.4		
16							5.2	0.4	0.1			
17							3.2	0.9	0.1			
18						*30.7	2.4	1.6	0.1			
19						31.0	0.9	0.4	0.1			
20						30.7	1.6	0.4	0.1			
21						30.7	1.6	0.4	0.1			
22						30.7	1.6	0.4	0.1			
23						64.0	1.6	0.4(Rain)				
24							0.9	0.2				
25						64.0	0.9	0.2				
26						52.0	0.9	0.1				
27						56.0	*0.7	0.1				
28						34.0	0.9	0.4				
29						27.0	0.9	0.1				
30						27.0	0.9	0.2				
31							0.4	6.4				
Tot.Sec Ft.Days						477.8	173.6	27.1	2.5			
Mean Sec.Ft:						39.82	5.60	0.87	0.11			
Total Ac.Ft:						947	344	54	5			

Discharges obtained by applying gage heights to rating curve.

*Current meter measurements.

Period 1350

TABLE 11

DESCRIPTIONS OF LANDS IRRIGATED

FROM

NORTH COW CREEK AND ITS TRIBUTARIES

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Angle, Evert G.	Excelsior Ditch Diversions #49 to #55, incl.	0.4			NE¼ SE¼ S 12 T 33 N R 1 W	Garden	13
		0.1			NW¼ SE¼ S 12 T 33 N R 1 W	Garden	13
		2.9			SW¼ SE¼ S 12 T 33 N R 1 W	Unseeded Pasture	13
		1.8			SW¼ SE¼ S 12 T 33 N R 1 W	Grain	13
		0.2			SW¼ SE¼ S 12 T 33 N R 1 W	Garden	13
		1.4			NE¼ SE¼ S 12 T 33 N R 1 W	Orchard	13
			1.7		NW¼ SE¼ S 12 T 33 N R 1 W	Pasture	13
			0.5		SW¼ SE¼ S 12 T 33 N R 1 W	Pasture	13
		6.0	2.2	9.0			
	Angle Spring Ditch. Diversion #67	0.2			NE¼ SE¼ S 12 T 33 N R 1 W	Orchard	13
		0.2		0.2			
				9.2	GRAND TOTAL		
Asher, J. G.	Hoffman Ditch Diversion #102	1.4			SE¼ SW¼ S 36 T 34 N R 2 W	Alfalfa	19
		1.1			SW¼ SW¼ S. 36 T 34 N R 2 W	Alfalfa	19
		3.5			Lot 3 Sec 1 T 33 N R 2 W	Alfalfa	19
		1.2*			Lot 3 Sec 1 T 33 N R 2 W	Alfalfa 1921	19
		0.5*			Lot 3 Sec 1 T 33 N R 2 W	Alfalfa 1922	19
		2.1			Lot 4 Sec 1 T 33 N R 2 W	Alfalfa	19
		1.7			Lot 1 Sec2 T 33 N R 2 W	Alfalfa	19
		1.1*			Lot 1 Sec 2 T 33 N R 2 W	Rye Grain	19

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont'd)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Asher, J. G. (cont.)	Hoffman Ditch Diversion #102	0.9			Lot 1 Sec 2 T 33 N R 2 W	Orchard: Garden	19
		1.1*			Lot 1 Sec 2 T 33 N R 2 W	Alfalfa: 1920.	19
		14.6		14.6	TOTAL AND GRAND TOTAL		
Ballard, James W.	Welch and Strayer Ditch System Diversions 45, 46, 47, and 48.	0.8			SW¼ SW¼ S 30 T 33 N R 1 W	Orchard:	21
		0.5*			SW¼ SW¼ S 30 T 33 N R 1 W	Corn 1922	21
		4.5			SW¼ SE¼ S 30 T 33 N R 1 W	Pasture	21
		0.9			SE¼ SW¼ S 30 T 33 N R 1 W	Orchard:	21
		0.6			SE¼ SW¼ S 30 T 33 N R 1 W	Garden	21
		0.3			SE¼ SW¼ S 30 T 33 N R 1 W	Grass	21
		2.1			SE¼ SW¼ S 30 T 33 N R 1 W	Pasture:	21
		1.4			SE¼ SW¼ S 30 T 33 N R 1 W	Pasture:	21
		1.0*			SE¼ SW¼ S 30 T 33 N R 1 W	Corn 1922	21
		12.1		12.1	TOTAL AND GRAND TOTAL		
Bibbens, B. F.	Bibbens Ditch Diversion 89.	5.9			SW¼ SW¼ S 4 T 33 N R 1 W	Meadow	17
		0.9			SW¼ SW¼ S 4 T 33 N R 1 W	Grass & Garden	17
		0.4			SW¼ SW¼ S 4 T 33 N R 1 W	Orchard	17
		3.4			SW¼ SW¼ S 4 T 33 N R 1 W	Sidehill: Pasture	17
			2.8		SW¼ SW¼ S 4 T 33 N R 1 W	Pasture	17
		10.6	2.8	13.4	TOTAL AND GRAND TOTAL		
Bidwell, Ida	Halcomb Ditch Diversion 32.	4.1			NW¼ SE¼ S 11 T 34 N R 1 W	Meadow	5
		2.8			SW¼ NE¼ S 11 T 34 N R 1 W	Meadow	5

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont'd)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Bidwell, Ida (cont.)	Holcomb Ditch Diversion 32.	1.2			SW¼ NE¼ S 11 T 34 N R 1 W	Pasture	5
		3.2			SW¼ NE¼ S 11 T 34 N R 1 W	Alfalfa	5
		4.0			NE¼ NW¼ S 11 T 34 N R 1 W	Meadow	5
		6.8*			NE¼ NW¼ S 11 T 34 N R 1 W	Meadow 1921	5
		2.6*			NE¼ NW¼ S 11 T 34 N R 1 W	Corn 1921	5
		23.0			NW¼ NE¼ S 11 T 34 N R 1 W	Meadow	5
		5.7*			NW¼ NE¼ S 11 T 34 N R 1 W	Grain 1917	5
		5.3			NE¼ NE¼ S 11 T 34 N R 1 W	Meadow	5
		4.2*			NE¼ NE¼ S 11 T 34 N R 1 W	Grain 1917	5
		4.0*			SE¼ SE¼ S 2 T 34 N R 1 W	Grain 1917	5
			1.4		NW¼ NE¼ S 11 T 34 N R 1 W	Meadow	5
			1.4		NE¼ NE¼ S 11 T 34 N R 1 W	Meadow	5
			0.2		SE¼ SE¼ S 2 T 34 N R 1 W	Meadow	5
		66.9	3.0	69.9	TOTAL AND GRAND TOTAL		
Bishop, H. O.	Bishop Ditch Diversion 4	0.4			NW¼ NW¼ S 20 T 34 N R 1 E	Garden	4
		1.4			SW¼ SW¼ S 17 T 34 N R 1 E	Garden	4
		0.6			SW¼ SW¼ S 17 T 34 N R 1 E	Grain	4
		1.6			SW¼ SW¼ S 17 T 34 N R 1 E	Orchard	4
		2.4			SW¼ SW¼ S 17 T 34 N R 1 E	Meadow	4
		6.4		6.4			
	Bishop Spring Ditch. Diversions 5 & 6:	1.9			SW¼ SW¼ S 17 T 34 N R 1 E	Meadow	4
	Water from main ditch used also.	0.6			SW¼ SW¼ S 17 T 34 N R 1 E	Alfalfa	4

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont'd)

Name of Owner	Name of Ditch	Acreage Irrigated Irr	Sub-irr	Total	Description	Crop	Map Sheet
	Bishop Spring						
Bishop, N. O. (cont.)	Ditch. Diversions 5 & 6	0.2			SW¼ SW¼ S 17 T 34 N R 1 E	Grass	4
		2.7		2.7			
				9.1	GRAND TOTAL		
Bogue, W. A.	Bogue Pump. Diversion 115	0.2			SE¼ SE¼ S 32 T 32 N R 3 W	Alfalfa	29
		2.7			SE¼ SE¼ S 32 T 32 N R 3 W	Garden	29
		5.2			SW¼ SE¼ S 32 T 32 N R 3 W	Alfalfa	29
		3.0			SW¼ SE¼ S 32 T 32 N R 3 W	Garden	29
		11.1		11.1	TOTAL AND GRAND TOTAL		
Boyle, Geo. J.	Boyle Pump. Diversion 114.	0.6*			NW¼ NE¼ S 32 T 32 N R 3 W	Alfalfa	29
		0.3*			SW¼ NE¼ S 32 T 32 N R 3 W	Orchard	29
		0.4*			SW¼ NE¼ S 32 T 32 N R 3 W	Alfalfa	29
		5.0			SW¼ NE¼ S 32 T 32 N R 3 W	Garden & Orchard	29
		2.5			SW¼ NE¼ S 32 T 32 N R 3 W	Alfalfa	29
		0.4			SE¼ NE¼ S 32 T 32 N R 3 W	Garden & Orchard	29
		1.7			SE¼ NE¼ S 32 T 32 N R 3 W	Alfalfa	29
		1.0			NW¼ SE¼ S 32 T 32 N R 3 W	Alfalfa	29
		0.3			NE¼ SE¼ S 32 T 32 N R 3 W	Alfalfa	29
		12.2		12.2	TOTAL AND GRAND TOTAL		
Butsbach, H. H.	Butsbach Pump Diversion 116.	0.5*			Lot 2 Sec 5 T 31 N R 3 W	Orchard & Vineyard	29
	Pump not operated in 1925. Last irri. in 1922.	0.5*			SW¼ SE¼ S 5 T 31 N R 3 W	Garden	29
		2.5*			SW¼ SE¼ S 5 T 31 N R 3 W	Alfalfa	29

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont'd)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Butzbach, H. H. (cont.)	Butzach Pump Diversion 116.	0.4*			Lot 1 Sec 5 T 31 N R 3 W	Alfalfa	29
		11.8*			SE¼ NE¼ S 5 T 31 N R 3 W	Alfalfa	29
		15.5		15.5	TOTAL AND GRAND TOTAL		
Calkins, W. A.	Sam Rice Ditch Diversion 11.	2.3			SE¼ NE¼ S 26 T 34 N R 1 W	Meadow	8
		0.2			SE¼ NE¼ S 26 T 34 N R 1 W	Pasture	8
		0.2			SE¼ NE¼ S 26 T 34 N R 1 W	Grass	8
		3.8			SE¼ NE¼ S 26 T 34 N R 1 W	Pasture 1922	8
		0.7*			SE¼ NE¼ S 26 T 34 N R 1 W	Meadow 1922	8
		2.7*			NE¼ NE¼ S 26 T 34 N R 1 W	Garden 1921	8
		0.1			NE¼ NE¼ S 26 T 34 N R 1 W	Grass	8
		10.0		10.0	TOTAL AND GRAND TOTAL		
Carswell, J. B.	Welch and Strayer Ditch System. Diversions 45, 46, 47, and 48	8.0			NE¼ SE¼ S 25 T 33 N R 2 W	Orchard	22
		2.1			NE¼ SE¼ S 25 T 33 N R 2 W	Meadow	22
		0.4			NE¼ SE¼ S 25 T 33 N R 2 W	Berries	22
		2.8			NE¼ SE¼ S 25 T 33 N R 2 W	Garden	22
		0.7			NE¼ SE¼ S 25 T 33 N R 2 W	Sorghum	22
		0.4*			NE¼ SE¼ S 25 T 33 N R 2 W	Pasture	22
		0.5			NW¼ SE¼ S 25 T 33 N R 2 W	Corn	22
		14.9		14.9	TOTAL AND GRAND TOTAL		
Chatham, J. G.	Cook & Butcher Ditch. Diversion 110.	7.4			SE¼ NW¼ S 20 T 32 N R 3 W	Corn	27
		4.5			SE¼ NW¼ S 20 T 32 N R 3 W	Vineyard	27

*Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont'd)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Chatham, J. G. (cont.)	Cook & Butcher Ditch.	4.4			$SE\frac{1}{4}$ $NW\frac{1}{4}$ S 20 T 32 N R 3 W	Alfalfa	27
	Diversion #110.	1.0			$SE\frac{1}{4}$ $NW\frac{1}{4}$ S 20 T 32 N R 3 W	Garden	27
		0.9*			$SE\frac{1}{4}$ $NW\frac{1}{4}$ S 20 T 32 N R 3 W	Garden	27
		18.0		18.0	TOTAL AND GRAND TOTAL 1922		
Dungan, V. G.	Dungan Gulch Upper Ditch Diversion 81.	0.4			$SE\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Pasture	16
		0.2			$SE\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Corn	16
		1.3			$SE\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Orchard	16
		3.3			$NE\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Orchard	16
		5.2		5.2			
	Dungan House Pipe Line. Diversion 82.	0.3			$NE\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Grass	16
		0.3		0.3			
	Dungan Gulch Main Ditch. Diversion 83.	0.7			$SE\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Orchard	16
		2.7			$SE\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Pasture	16
		1.2			$SE\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Corn	16
		7.3			$SE\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Meadow	16
		7.3			$SW\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Meadow	16
		0.4			$SW\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Pasture	16
		0.4			$NE\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Garden	16
		0.2			$NE\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Pasture	16
			1.5		$SE\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Pasture	16
			2.5		$SW\frac{1}{4}$ $SE\frac{1}{4}$ S 3 T 33 N R 1 W	Meadow	16
		20.2	4.0	24.2			

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont'd)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
	Dungan Upper						
Dungan, V. G. (cont.)	Unnamed Wash Ditch. Diversion 84.	2.9			SW¼ SE¼ S 3 T 35 N R 1 W	Pasture	16
		2.9		2.9			
	Dungan Middle Unnamed Wash Ditch. Diversion 85.	0.9			SW¼ SE¼ S 3 T 35 N R 1 W	Meadow	16
		0.9		0.9			
	Dungan Lower Unnamed Wash Ditch. Diversion 86.	0.9			SW¼ SE¼ S 3 T 35 N R 1 W	Meadow	16
		0.9		0.9			
	Dungan Little Valley Spr. Ditch. Diversion 87.	1.9			SE¼ SW¼ S 3 T 35 N R 1 W	Pasture	16
		1.9		1.9			
				36.3	GRAND TOTAL		
Riler, Wm.	Bibbens Ditch Diversion 89.	3.6			SE¼ SE¼ S 5 T 35 N R 1 W	Meadow	17
		0.5			SE¼ SE¼ S 5 T 35 N R 1 W	Corn	17
		1.9			SE¼ SE¼ S 5 T 35 N R 1 W	Garden	17
		0.1			SE¼ SE¼ S 5 T 35 N R 1 W	Sidehill Pasture	17
		1.2			SW¼ SE¼ S 5 T 35 N R 1 W	Garden	17
		1.1			SW¼ SE¼ S 5 T 35 N R 1 W	Alfalfa	17
		0.6			SW¼ SE¼ S 5 T 35 N R 1 W	Meadow	17
			1.0		SE¼ SE¼ S 5 T 35 N R 1 W	Pasture	17
		9.0	1.0	10.0	TOTAL AND GRAND TOTAL		

TABLE 11 (cont'd)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Eldridge, G. R.	Eldridge Upper Ditch.	3.5			SW¼ NE¼ S 4 T 33 N R 1 W	Sidehill Pasture	16
	Diversion 88.	3.7			SE¼ NW¼ S 4 T 33 N R 1 W	Sidehill Pasture	17
		0.1			NE¼ SW¼ S 4 T 33 N R 1 W	Sidehill Pasture	17
		5.3			SW¼ NW¼ S 4 T 33 N R 1 W	Pasture	17
		19.4			SW¼ NW¼ S 4 T 33 N R 1 W	Meadow	17
		1.0			Lot 4 Sec 4 T 33 N R 1 W	Meadow	17
		0.4			Lot 4 Sec 4 T 33 N R 1 W	Pasture	17
		3.1			Lot 1 Sec 5 T 33 N R 1 W	Meadow	17
		3.0*			Lot 1 Sec 5 T 33 N R 1 W	Pasture 1920	17
		11.5			SE¼ NE¼ S 5 T 33 N R 1 W	Meadow	17
		3.5			NW¼ SW¼ S 4 T 33 N R 1 W	Meadow	17
		54.5		54.5			
	Eldridge Lower Ditch. Diversion 90.	1.6			NE¼ SW¼ S 4 T 33 N R 1 W	Meadow	17
		8.7			NW¼ SW¼ S 4 T 33 N R 1 W	Meadow	17
		11.6			NE¼ SE¼ S 5 T 33 N R 1 W	Meadow	17
		1.0			NE¼ SE¼ S 5 T 33 N R 1 W	Orchard	17
		22.9		22.9			
	Eldridge Island Ditch. Diversion 91.	1.3			NW¼ SW¼ S 4 T 33 N R 1 W	Pasture	17
		0.4			NE¼ SE¼ S 5 T 33 N R 1 W	Pasture	17
		1.7		1.7			

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont'd)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-Irr	Total	Description	Crop	Map Sheet
Eldridge, G.R.	Eldridge House Ditch.	0.8			NE¼ SE¼ S 5 T 33 N R 1 W	Garden	17
	Diversion 92.	0.2			NW¼ SE¼ S 5 T 33 N R 1 W	Garden	17
		1.0		1.0			
				80.1	GRAND TOTAL		
Ellerkamp, Richard	Ellerkamp Ditch. Diversion 28.	0.8			NW¼ SW¼ S 36 T 34 N R 1 W	Vineyard	2A
		0.7			NW¼ SW¼ S 36 T 34 N R 1 W	Garden	2A
		1.5		1.5	TOTAL AND GRAND TOTAL		
English, E. C.	Welch & Strayer Ditch System	1.0			SW¼ NE¼ S 35 T 33 N R 2 W	Garden & Orchard	23
	Diversions 45, 46, 47, & 48.	2.5			SW¼ NE¼ S 35 T 33 N R 2 W	Meadow	23
		0.1			SW¼ NE¼ S 35 T 33 N R 2 W	Grass	23
		6.3			SW¼ NE¼ S 35 T 33 N R 2 W	Pasture	23
		14.2			NW¼ NE¼ S 35 T 33 N R 2 W	Meadow	23
		2.7			NW¼ NE¼ S 35 T 33 N R 2 W	Pasture	23
		0.8			NW¼ NE¼ S 35 T 33 N R 2 W	Grain	23
		3.7			NE¼ NW¼ S 35 T 33 N R 2 W	Meadow	23
		6.9			NE¼ NW¼ S 35 T 33 N R 2 W	Pasture	23
		2.8			NE¼ NW¼ S 35 T 33 N R 2 W	Grain	23
			0.6		NW¼ NE¼ S 35 T 33 N R 2 W	Pasture	23
		41.0	0.6	41.6	TOTAL AND GRAND TOTAL		
Erickson, C.S.	Erickson Ditch Diversions 7, 8, and 9.	0.8			NW¼ NE¼ S 19 T 34 N R 1 E	Meadow	4
		12.9			SW¼ SE¼ S 18 T 34 N R 1 E	Meadow	4

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Erickson, C. S. (cont.)	Erickson Ditch Diversions 7, 8, and 9.	1.2			SW¼ SE¼ S 18 T 34 N R 1 E	Grain & Garden	4
		0.4			NW¼ SE¼ S 18 T 34 N R 1 E	Meadow	4
		6.7			SE¼ SW¼ S 18 T 34 N R 1 E	Meadow	4
		2.0			SE¼ SW¼ S 18 T 34 N R 1 E	Pasture	4
		24.0		24.0			
	Erickson Spring Pipe Line. Diversion 10.	0.4			NW¼ SE¼ S 18 T 34 N R 1 E	Meadow	4
		0.2			NW¼ SE¼ S 18 T 34 N R 1 E	Grass	4
		0.4			NE¼ SW¼ S 18 T 34 N R 1 E	Orchard & Garden	4
		0.1			SE¼ SW¼ S 18 T 34 N R 1 E	Orchard & Garden	4
		1.1		1.1			
				25.1	GRAND TOTAL		
Fitzpatrick, I.	Cook & Butcher Ditch. Diversion 110.	12.7			NE¼ SW¼ S 20 T 32 N R 3 W	Corn	28
		9.0			NE¼ SW¼ S 20 T 32 N R 3 W	Alfalfa	28
		2.2			NE¼ SW¼ S 20 T 32 N R 3 W	Orchard & Pasture	28
		1.4			NE¼ SW¼ S 20 T 32 N R 3 W	Garden	28
		0.4			NE¼ SW¼ S 20 T 32 N R 3 W	Orchard	28
		0.3			NE¼ SW¼ S 20 T 32 N R 3 W	Vineyard	28
		0.4			NE¼ SW¼ S 20 T 32 N R 3 W	Grass	28
		2.5*			NE¼ SW¼ S 20 T 32 N R 3 W	Grain	28
		0.1*			NE¼ SW¼ S 20 T 32 N R 3 W	No Crop	28
		0.6*			NW¼ SE¼ S 20 T 32 N R 3 W	No Crop	28
		2.3*			SW¼ SE¼ S 20 T 32 N R 3 W	No Crop	28
		7.1			SE¼ SW¼ S 20 T 32 N R 3 W	Alfalfa	28
		39.0		39.0	TOTAL AND GRAND TOTAL		

* Not irrigated in 1925 but irrigated subsequent to 1918.

TABLE 11 (cont'd)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Grant, Jesse	Pehrson-Grant Strawn Ditch Diversion 29.	14.0			SE¼ NW¼ S 34 T 34 N R 1 W	Meadow	9
		3.2			SE¼ NW¼ S 34 T 34 N R 1 W	Pasture	9
		0.3			SE¼ NW¼ S 34 T 34 N R 1 W	Garden	9
		0.4*			SE¼ NW¼ S 34 T 34 N R 1 W	Orchard 1922	9
		0.8*			SE¼ NW¼ S 34 T 34 N R 1 W	Meadow 1919	9
		1.3*			SE¼ NW¼ S 34 T 34 N R 1 W	Corn 1920	9
		0.2			NE¼ SW¼ S 34 T 34 N R 1 W	Brush Pasture	9
		0.8			NE¼ SW¼ S 34 T 34 N R 1 W	Pasture	9
		2.4			SW¼ NW¼ S 34 T 34 N R 1 W	Meadow	9
		0.3			SW¼ NW¼ S 34 T 34 N R 1 W	Garden	9
		10.1			SW¼ NW¼ S 34 T 34 N R 1 W	Pasture	9
		33.8		33.8			
	Grant Spring Ditch and domestic Pipe Line Diversion 74.	0.1			SW¼ NW¼ S 34 T 34 N R 1 W	Orchard	9
		0.2			SW¼ NW¼ S 34 T 34 N R 1 W	Grass	9
		0.3		0.3			
				34.1	GRAND TOTAL		
Grey, Lizzie A.	Gray Ditch. Diversion 111.	1.7			SW¼ SE¼ S 20 T 32 N R 3 W	Alfalfa	28
		6.8			SE¼ SE¼ S 20 T 32 N R 3 W	Alfalfa	28
		3.9*			SE¼ SE¼ S 20 T 32 N R 3 W	Corn 1921	28
		0.5			NW¼ NE¼ S 29 T 32 N R 3 W	Alfalfa	28
		0.2			NE¼ NE¼ S 29 T 32 N R 3 W	Alfalfa	28

* Not irrigated in 1923 but irrigated subsequent to 1916.

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Gray, Lizzie A. (cont.)	Gray Ditch. Diversion 111.	0.8*			NE¼ NE¼ S 29 T 32 N R 3 W	Garden	28
		0.8*			NE¼ NE¼ S 29 T 32 N R 3 W	Corn 1921	28
		14.7		14.7			
	Gray Upper Pump Diversion 112.	0.6*			SE¼ NE¼ S 29 T 32 N R 3 W	Garden 1922	28
		2.8*			NE¼ SE¼ S 29 T 32 N R 3 W	Garden 1922	28
		1.6*			NE¼ SE¼ S 29 T 32 N R 3 W	Garden 1918	28
		5.0		5.0			
	Gray Lower Pump. Diversion 113.	2.0			SW¼ SE¼ S 29 T 32 N R 3 W	Alfalfa	28
		0.4			SW¼ SE¼ S 29 T 32 N R 3 W	Garden	28
		2.4		2.4			
				22.1	GRAND TOTAL		
Hedley, J. G.	Hedley Upper Ditch. Diversion 40.	1.4			NW¼ NE¼ S 28 T 34 N R 1 W	Alfalfa	10
		0.2			NW¼ NE¼ S 28 T 34 N R 1 W	Meadow	10
		1.9			NE¼ NW¼ S 28 T 34 N R 1 W	Meadow	10
		4.7			NW¼ NW¼ S 28 T 34 N R 1 W	Meadow	10
		1.6			NW¼ NW¼ S 28 T 34 N R 1 W	Garden	10
		0.1			NW¼ NW¼ S 28 T 34 N R 1 W	Corn	10
		5.1			NE¼ NE¼ S 29 T 34 N R 1 W	Meadow	10
		2.0			NE¼ NE¼ S 29 T 34 N R 1 W	Alfalfa	10
		17.0		17.0			

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont.)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Hadley, J. G. (cont.)	Hadley Lower Ditch. Diversion 41.	0.2			SE¼ NW¼ S 28 T 34 N R 1 W	Orchard	10
		0.3			SE¼ NW¼ S 28 T 34 N R 1 W	Potatoes	10
		0.2*			SE¼ NW¼ S 28 T 34 N R 1 W	Orchard	10
		1.0*			SW¼ NW¼ S 28 T 34 N R 1 W	Orchard	10
		0.5*			NW¼ NW¼ S 28 T 34 N R 1 W	Orchard	10
		1.3			NE¼ NW¼ S 28 T 34 N R 1 W	Orchard	10
		0.3			NE¼ NW¼ S 28 T 34 N R 1 W	Potatoes	10
		3.8		3.8			
				20.8	GRAND TOTAL		
Haley, Alonzo	Johnson-Haley Ditch. Diversion 31.	1.1*			NE¼ NE¼ S 14 T 34 N R 1 W	Corn 1921	6
		1.2*			NW¼ NE¼ S 14 T 34 N R 1 W	Corn 1921	6
		0.9			SE¼ NE¼ S 14 T 34 N R 1 W	Meadow	6
		0.9*			SE¼ NE¼ S 14 T 34 N R 1 W	Potatoes 1922	6
		1.8*			SE¼ NE¼ S 14 T 34 N R 1 W	Grain 1922	6
		3.5*			SE¼ NE¼ S 14 T 34 N R 1 W	Corn 1921	6
		7.2			SW¼ NE¼ S 14 T 34 N R 1 W	Meadow	6
		2.0			SW¼ NE¼ S 14 T 34 N R 1 W	Orchard	6
		0.1			SW¼ NE¼ S 14 T 34 N R 1 W	Garden	6
		0.2			SW¼ NE¼ S 14 T 34 N R 1 W	Grass	6
		0.1*			SW¼ NE¼ S 14 T 34 N R 1 W	Grain 1922	6
		6.0*			SW¼ NE¼ S 14 T 34 N R 1 W	Corn 1921	6
		0.6			NW¼ SE¼ S 14 T 34 N R 1 W	Garden	6
		0.2			NW¼ SE¼ S 14 T 34 N R 1 W	Clover	6

* Not irrigated in 1923 but irrigated subsequent to 1915.

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Haley, Alonzo (cont.)	Johnson-Haley Ditch. Diversion 31.	4.1			NW¼ SE¼ S 14 T 34 N R 1 W	Meadow	6
		1.0			NW¼ SE¼ S 14 T 34 N R 1 W	Pasture	6
		0.1			NW¼ SE¼ S 14 T 34 N R 1 W	Orchard	6
			0.3		SE¼ NE¼ S 14 T 34 N R 1 W	Meadow	6
			0.7		SW¼ NE¼ S 14 T 34 N R 1 W	Meadow	6
			0.7		NW¼ SE¼ S 14 T 34 N R 1 W	Meadow	6
		30.9	1.7	32.6	TOTAL AND GRAND TOTAL		
Hawes, J. C.	Hawes Upper Spreading Dam Diversion 59.	0.4			SE¼ NW¼ S 7 T 33 N R 1 E	Brush Pasture	13
		0.2			NE¼ NW¼ S 7 T 33 N R 1 E	Brush Pasture	13
		0.6		0.6			
	Hawes Orchard Ditch. Diversions 57 and 58.	0.7			NE¼ NW¼ S 7 T 33 N R 1 E	Pasture	13
		0.9			NE¼ NW¼ S 7 T 33 N R 1 E	Orchard	13
		1.6		1.6			
	Hawes Garden Ditch. Diversion 60.	0.9			NE¼ NW¼ S 7 T 33 N R 1 E	Garden	13
		0.3			Lot 1, Sec. 7 T 33 N R 1 E	Garden	13
		1.2		1.2			
	Hawes Short Garden Ditch. Diversion 62.	0.2			Lot 1 Sec 7 T 33 N R 1 E	Garden	13
		0.2		0.2			
	Hawes Lower Spreading Dam Diversion 61.	0.8			Lot 2 Sec 7 T 33 N R 1 E	Pasture	13
		0.3			Lot 1 Sec 7 T 33 N R 1 E	Pasture	13
		1.1		1.1			

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Hawes, J. C. (cont.)	Hawes North Garden Ditch. Diversion 66.	0.3			SE¼ NE¼ S 12 T 33 N R 1 W	Garden	13
		0.3		0.3			
	Hawes South Garden Ditch. Diversion 65.	0.5			SE¼ NE¼ S 12 T 33 N R 1 W	Garden	13
		0.5		0.5			
				5.5	GRAND TOTAL		
Herrick, E. D.	Welch & Strayer Ditch System	0.7			SE¼ SE¼ S 25 T 33 N R 2 W	Vineyard and Berries	22
	Diversions 45, 46, 47, & 48.	0.4			SE¼ SE¼ S 25 T 33 N R 2 W	Straw-berries	22
		0.8			SE¼ SE¼ S 25 T 33 N R 2 W	Vineyard	22
		0.6			SE¼ SE¼ S 25 T 33 N R 2 W	Garden	22
		5.0			SE¼ SE¼ S 25 T 33 N R 2 W	Orchard	22
		1.2			SW¼ SE¼ S 25 T 33 N R 2 W	Garden	22
			2.2		SE¼ SE¼ S 25 T 33 N R 2 W	Meadow	22
			0.3		SW¼ SE¼ S 25 T 33 N R 2 W	Meadow	22
		9.7	2.5	11.2	TOTAL AND GRAND TOTAL		
Hobson, DeForest	Hobson Upper Ditch. Diversion 93.	0.5			SW¼ SE¼ S 5 T 33 N R 1 W	Alfalfa	17
		5.5			SE¼ SW¼ S 5 T 33 N R 1 W	Alfalfa	17
		2.7			SW¼ SW¼ S 5 T 33 N R 1 W	Alfalfa	17
		1.2			SE¼ SE¼ S 6 T 33 N R 1 W	Alfalfa	18
			0.8		SE¼ SW¼ S 5 T 33 N R 1 W	Meadow	17
		9.9	0.8	10.7			

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Hobson, DeForest	Hobson Lower Ditch. Diversion 94.	1.0			SW¼ SW¼ S 5 T 33 N R 1 W	Alfalfa	17
		1.2			SW¼ SW¼ S 5 T 33 N R 1 W	Brush Pasture	17
		1.2			SE¼ SE¼ S 6 T 33 N R 1 W	Brush Pasture	18
		7.2			SE¼ SE¼ S 6 T 33 N R 1 W	Alfalfa	18
		5.2			NE¼ SE¼ S 6 T 33 N R 1 W	Alfalfa	18
		4.1			NW¼ SE¼ S 6 T 33 N R 1 W	Meadow & Orchard	18
		1.8			NW¼ SE¼ S 6 T 33 N R 1 W	Garden	18
		4.7			NW¼ SE¼ S 6 T 33 N R 1 W	Alfalfa	18
		0.8			NW¼ SE¼ S 6 T 33 N R 1 W	Grass & Garden	18
		1.0			NW¼ SE¼ S 6 T 33 N R 1 W	Pasture	18
		0.2			NW¼ SE¼ S 6 T 33 N R 1 W	Pasture	18
		4.1			SW¼ NE¼ S 6 T 33 N R 1 W	Alfalfa	18
		1.1			SW¼ NE¼ S 6 T 33 N R 1 W	Garden	18
		6.8			SE¼ NW¼ S 6 T 33 N R 1 W	Alfalfa	18
		2.4			Lot 3 Sec 6 T 33 N R 1 W	Alfalfa	18
			0.1		NW¼ SE¼ S 6 T 33 N R 1 W	Pasture	18
			0.3		SW¼ NW¼ S 6 T 33 N R 1 W	Pasture	18
		42.8	0.4	43.2			
	Hobson Orchard Springs. Diversions 95,96	0.7			Lot 6 Sec 6 T 33 N R 1 W	Orchard	18
		0.7		0.7			
				54.6	GRAND TOTAL		

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Johnson, E. F.	Johnson-Haley Ditch.	9.4			SE¼ SE¼ S 14 T 34 N R 1 W	Pasture	6
	Diversion 31.	0.9			SE¼ SE¼ S 14 T 34 N R 1 W	Brush	6
		16.1			SW¼ SE¼ S 14 T 34 N R 1 W	Pasture	6
		1.6			SW¼ SE¼ S 14 T 34 N R 1 W	Garden & Orchard	6
		0.8			SW¼ SE¼ S 14 T 34 N R 1 W	Pasture	6
		0.1			SW¼ SE¼ S 14 T 34 N R 1 W	Brush	6
			1.8		SW¼ SE¼ S 14 T 34 N R 1 W	Pasture Meadow	6
		28.9	1.8	30.7			
	Johnson Waste-water Ditch. Diversion 35.	1.2			SW¼ SE¼ S 14 T 34 N R 1 W	Meadow	6
		1.2*			SW¼ SE¼ S 14 T 34 N R 1 W	Meadow 1921	6
			1.3		SW¼ SE¼ S 14 T 34 N R 1 W	Meadow	6
		2.4	1.3	3.7			
				34.4	GRAND TOTAL		
Kenyon, F. H.	Kenyon Ditch. Diversion 17, 18 and 19.	6.8			SE¼ NE¼ S 32 T 34 N R 1 E	Meadow	1
		7.1			SW¼ NE¼ S 32 T 34 N R 1 E	Meadow	1
		2.9			SW¼ NE¼ S 32 T 34 N R 1 E	Garden	1
		1.2			SW¼ NE¼ S 32 T 34 N R 1 E	Grass	1
		2.6			SW¼ NE¼ S 32 T 34 N R 1 E	Pasture	1
		0.6			SW¼ NE¼ S 32 T 34 N R 1 E	Brush Pasture	1
		0.7*			SW¼ NE¼ S 32 T 34 N R 1 E	Meadow 1922	1
		0.3			NW¼ NE¼ S 32 T 34 N R 1 E	Meadow	1
		22.2		22.2			

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Kenyon, F. H. (cont.)	Kenyon Upper Spring Ditch. Diversion 20.	2.7			NE¼ NE¼ S 32 T 34 N R 1 E	Meadow	1
			0.2		SW¼ NE¼ S 32 T 34 N R 1 E	Meadow	1
		2.7	0.2	2.9			
	Kenyon Middle Spring Ditch. Diversion 21.	1.0			SW¼ NE¼ S 32 T 34 N R 1 E	Meadow	1
		1.0*			SW¼ NE¼ S 32 T 34 N R 1 E	Beans 1921	1
		0.3*			SE¼ NE¼ S 32 T 34 N R 1 E	Beans 1921	1
			0.1		SE¼ NE¼ S 32 T 34 N R 1 E	Meadow	1
		2.3	0.1	2.4			
	Kenyon Lower Spring Ditch. Diversion 22.	0.4			SW¼ NE¼ S 32 T 34 N R 1 E	Meadow	1
		0.4		0.4			
				27.9	GRAND TOTAL		
Lemm, Chas. L.	Woodman Ditch. Diversion 107.	0.9*			NW¼ SW¼ S 36 T 33 N R 3 W	Meadow 1919	25
		0.4			NW¼ SW¼ S 36 T 33 N R 3 W	Alfalfa	25
		0.7			SW¼ SW¼ S 36 T 33 N R 3 W	Alfalfa	25
		1.3			SW¼ SW¼ S 36 T 33 N R 3 W	Pasture	25
		4.4*			SW¼ SW¼ S 36 T 33 N R 3 W	Meadow 1919	25
		2.0			NE¼ SE¼ S 35 T 33 N R 3 W	Alfalfa	26
		20.0			SE¼ SE¼ S 35 T 33 N R 3 W	Alfalfa	26
		2.4			SE¼ SE¼ S 35 T 33 N R 3 W	Pasture	26
		2.7			NW¼ SE¼ S 35 T 33 N R 3 W	Pasture	26
		13.3			SW¼ SE¼ S 35 T 33 N R 3 W	Alfalfa	26
		6.6			SW¼ SE¼ S 35 T 33 N R 3 W	Pasture	26

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Lemm, Chas. L. (cont.)	Woodman Ditch. Diversion 107.	0.9*			SW¼ SE¼ S 35 T 33 N R 3 W	Alfalfa: 1920	26
		13.6*			SE¼ SW¼ S 35 T 33 N R 3 W	Alfalfa: 1920	26
		6.2			SE¼ SW¼ S 35 T 33 N R 3 W	Pasture:	26
		1.9*			SE¼ SW¼ S 35 T 33 N R 3 W	Orchard & Alfalfa:	26
		2.7*			Lot 3 Sec 2 T 32 N R 3 W	Orchard & Alfalfa:	26
		0.1			Lot 3 Sec 2 T 32 N R 3 W	Pasture:	26
		0.7			SW¼ SW¼ S 35 T 33 N R 3 W	Garden	26
		4.2			SW¼ SW¼ S 35 T 33 N R 3 W	Vineyard:	26
		1.9			SW¼ SW¼ S 35 T 33 N R 3 W	Garden	26
		3.9			SW¼ SW¼ S 35 T 33 N R 3 W	Alfalfa:	26
		2.5*			SW¼ SW¼ S 35 T 33 N R 3 W	Alfalfa: 1920	26
		4.7			Lot 4 Sec 2 T 32 N R 3 W	Garden	26
		0.9			Lot 4 Sec 2 T 32 N R 3 W	Vineyard:	26
		6.4			Lot 4 Sec 2 T 32 N R 3 W	Alfalfa:	26
		0.2			Lot 4 Sec 2 T 32 N R 3 W	Grass	26
		1.1*			Lot 4 Sec 2 T 32 N R 3 W	Orchard: Alfalfa:	26
		0.6			Lot 4 Sec 2 T 32 N R 3 W	Pasture:	26
		107.2		107.2	TOTAL AND GRAND TOTAL		
Maxwell, Jennie and J.W.	Excelsior Ditch Diversions 49 to 55, incl.	4.2			NW¼ NW¼ S 13 T 33 N R 1 W	Meadow	14
		3.2			SW¼ NW¼ S 13 T 33 N R 1 W	Meadow	14
		7.1			SE¼ NE¼ S 14 T 33 N R 1 W	Meadow	14

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE II (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-Irr	Total	Description	Crop	Key Sheet
Maxwell, Jennie and J.W. (cont.)	Excelsior Ditch Diversions 49 to 55, incl.	0.7			SE¼ NE¼ S 14 T 33 N R 1 W	Garden	14
		0.1			SE¼ NE¼ S 14 T 33 N R 1 W	Grass	14
		4.2			SE¼ NE¼ S 14 T 33 N R 1 W	Pasture	14
		19.5		19.5	TOTAL AND GRAND TOTAL		
McCandless, Florence	Benbow Ditch Diversions 12 and 30, and McCandless Ditch Diversion 34.	2.9			NW¼ NE¼ S 23 T 34 N R 1 W	Beans	7
		0.8			NW¼ NE¼ S 23 T 34 N R 1 W	Garden	7
		0.5			NW¼ NE¼ S 23 T 34 N R 1 W	Orchard	7
		0.9			NW¼ NE¼ S 23 T 34 N R 1 W	Alfalfa	7
		0.8			E½ NE¼ S 23 T 34 N R 1 W	Grass	7
		0.3			NW¼ NE¼ S 23 T 34 N R 1 W	Meadow	7
		0.7			NW¼ NE¼ S 23 T 34 N R 1 W	Pasture	7
		1.0*			NW¼ NE¼ S 23 T 34 N R 1 W	Corn 1923	7
		0.8*			NW¼ NE¼ S 23 T 34 N R 1 W	Garden 1922	7
		0.2			NE¼ NW¼ S 23 T 34 N R 1 W	Grass	7
		1.1			NE¼ NW¼ S 23 T 34 N R 1 W	Garden	7
		0.2			NE¼ NW¼ S 23 T 34 N R 1 W	Pasture	7
		0.6			SE¼ NW¼ S 23 T 34 N R 1 W	Garden	7
		10.8		10.8			
	McCandless Waste water Ditch Diversion 36.	0.2*			SW¼ SE¼ S 14 T 34 N R 1 W	Meadow 1921	6
		0.2*			NW¼ NE¼ S 23 T 34 N R 1 W	Meadow 1921	7
		14.0*			NE¼ NW¼ S 23 T 34 N R 1 W	Meadow 1921	7

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
McCandless, Florence (cont.)	McCandless Waste-water Ditch Diversion 36.	3.2*			SE¼ NW¼ S 23 T 34 N R 1 W	Meadow 1921	7
		0.1*			SW¼ NW¼ S 23 T 34 N R 1 W	Meadow 1921	7
			0.1		NE¼ NW¼ S 23 T 34 N R 1 W	Meadow	7
		17.7	0.1	17.8			
	McCandless Upper Spring Ditch. Diversion 37.	1.1			SW¼ SW¼ S 14 T 34 N R 1 W	Garden	6
		1.0			SW¼ SW¼ S 14 T 34 N R 1 W	Meadow	6
		0.1			NW¼ NW¼ S 23 T 34 N R 1 W	Meadow	7
		0.2*			NW¼ NW¼ S 23 T 34 N R 1 W	Pasture 1922	7
		0.6*			SE¼ SW¼ S 14 T 34 N R 1 W	Meadow	6
		0.4*			SE¼ SW¼ S 14 T 34 N R 1 W	Pasture 1922	6
		2.8*			NE¼ NW¼ S 23 T 34 N R 1 W	Meadow 1922	7
		5.6*			NE¼ NW¼ S 23 T 34 N R 1 W	Pasture	7
			0.2		SE¼ SW¼ S 14 T 34 N R 1 W	Meadow	6
			0.2		NE¼ NW¼ S 23 T 34 N R 1 W	Meadow	7
		11.8	0.4	12.2			
	McCandless Lower Spring Ditch. Diversion 38.	1.2*			SE¼ SW¼ S 14 T 34 N R 1 W	Meadow 1922	6
		1.6*			NE¼ NW¼ S 23 T 34 N R 1 W	Meadow 1922	7
			0.7		NE¼ NW¼ S 23 T 34 N R 1 W	Meadow	7
		2.8	0.7	3.5			

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Destination	Crop	Map Sheet
McCandless, Florence (cont.)	Sub-irrigated (no ditch)		4.9		NE¼ NW¼ S 23 T 34 N R 1 W	Pasture	7
			2.4		SE¼ NW¼ S 23 T 34 N R 1 W	Pasture	7
			7.3	7.3			
				51.6	GRAND TOTAL		
McCarty, J. L.	Welch & Strayer Ditch System. Diversions 45, 46, 47, & 48.	0.8			Lot 3 Sec 30 T 33 N R 1 W	Orchard	21
		0.5			Lot 3 Sec 30 T 33 N R 1 W	Orchard & Garden	21
		0.8*			Lot 3 Sec 30 T 33 N R 1 W 1919	Pasture	21
		2.1		2.1	TOTAL AND GRAND TOTAL		
Olson Bros.	Cook & Butcher Ditch. Diversion 110.	6.9			NW¼ NW¼ S 29 T 32 N R 3 W	Pasture	28
		4.7			NW¼ NW¼ S 29 T 32 N R 3 W	Alfalfa	28
		1.5			NW¼ NW¼ S 29 T 32 N R 3 W	Garden	28
		2.5*			NW¼ NW¼ S 29 T 32 N R 3 W	Plowed Land	28
		3.8			NE¼ NW¼ S 29 T 32 N R 3 W	Garden	28
		3.3			NE¼ NW¼ S 29 T 32 N R 3 W	Alfalfa	28
		3.5			NE¼ NW¼ S 29 T 32 N R 3 W	Corn	28
		0.3			NE¼ NW¼ S 29 T 32 N R 3 W	Grass	28
		11.6			NW¼ NE¼ S 29 T 32 N R 3 W	Alfalfa	28
		5.4			SE¼ NW¼ S 29 T 32 N R 3 W	Alfalfa	28
		0.6			SE¼ NW¼ S 29 T 32 N R 3 W	Corn	28
		1.7*			SE¼ NW¼ S 29 T 32 N R 3 W 1921	Alfalfa	28
		45.8		45.8	TOTAL AND GRAND TOTAL		

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Destination	Crop	Map Sheet
Patton, Albert	Albert Patton South Ditch. Diversion 1	1.2			SW¼ SW¼ S 20 T 34 N R 1 E	Pasture	4
		1.3			NW¼ SW¼ S 20 T 34 N R 1 E	Pasture	4
		22.3			SE¼ SE¼ S 19 T 34 N R 1 E	Pasture	4
		1.8			NE¼ SE¼ S 19 T 34 N R 1 E	Orchard	4
		3.1			NE¼ SE¼ S 19 T 34 N R 1 E	Garden	4
		4.9			NE¼ SE¼ S 19 T 34 N R 1 E	Meadow	4
		2.5			NE¼ SE¼ S 19 T 34 N R 1 E	Grain	4
		7.4			NE¼ SE¼ S 19 T 34 N R 1 E	Pasture	4
		1.2			NW¼ SE¼ S 19 T 34 N R 1 E	Meadow	4
		1.1			NW¼ SE¼ S 19 T 34 N R 1 E	Garden	4
		0.3			NW¼ SE¼ S 19 T 34 N R 1 E	Grass	4
		3.8			NW¼ SE¼ S 19 T 34 N R 1 E	Pasture	4
		0.2			NE¼ SW¼ S 19 T 34 N R 1 E	Pasture	4
		0.4			SW¼ NE¼ S 19 T 34 N R 1 E	Pasture	4
		1.1			SE¼ NE¼ S 19 T 34 N R 1 E	Meadow	4
			0.9		SE¼ SE¼ S 19 T 34 N R 1 E	Pasture	4
			1.1		NW¼ SE¼ S 19 T 34 N R 1 E	Meadow	4
		52.6	2.0	54.6			
	Albert Patton North Ditch. Diversions 2 and 3.	0.3			NW¼ SW¼ S 20 T 34 N R 1 E	Pasture	4
		6.0			NE¼ SE¼ S 19 T 34 N R 1 E	Meadow	4
		0.5			NE¼ SE¼ S 19 T 34 N R 1 E	Garden	4
		0.5			NE¼ SE¼ S 19 T 34 N R 1 E	Pasture	4
		24.4			SE¼ NE¼ S 19 T 34 N R 1 E	Meadow	4

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Patton, Albert S. (cont.)	Albert Patton North Ditch.	0.1			SE¼ NE¼ S 19 T 34 N R 1 E	Pasture	4
	Diversions 2 and 3.		1.3		NE¼ SE¼ S 19 T 34 N R 1 E	Meadow	4
			0.8		SE¼ NE¼ S 19 T 34 N R 1 E	Meadow	4
		33.9	2.1	36.0			
				90.6	GRAND TOTAL		
Patton, Earl	Earl Patton Ditch. Diversions 13 and 15.	0.6			NE¼ SE¼ S 30 T 34 N R 1 E	Alfalfa	3
		0.6			NE¼ SE¼ S 30 T 34 N R 1 E	Meadow	3
		0.4			NE¼ SE¼ S 30 T 34 N R 1 E	Pasture	3
		2.3			NW¼ SE¼ S 30 T 34 N R 1 E	Meadow	3
		0.9			NW¼ SE¼ S 30 T 34 N R 1 E	Pasture	3
		3.2			NE¼ SW¼ S 30 T 34 N R 1 E	Meadow	3
		2.2			NE¼ SW¼ S 30 T 34 N R 1 E	Pasture	3
		2.5			Lot 3 Sec 30 T 34 N R 1 E	Meadow	3
		0.8			Lot 3 Sec 30 T 34 N R 1 E	Orchard	3
		0.4			Lot 3 Sec 30 T 34 N R 1 E	Garden	3
		3.3			Lot 3 Sec 30 T 34 N R 1 E	Pasture	3
		5.7			Lot 3 Sec 30 T 34 N R 1 E	Brush Pasture	3
		1.7			Lot 2 Sec 30 T 34 N R 1 E	Meadow	3
		0.2			Lot 2 Sec 30 T 34 N R 1 E	Garden	3
		0.2			Lot 3 Sec 30 T 34 N R 1 E	Meadow	3
			0.1		NE¼ SW¼ S 30 T 34 N R 1 E	Meadow	3
		25.0	0.1	25.1			

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Patton, Earl (cont.)	Earl Patton Spring Ditch.	0.6			SW¼ NE¼ S 30 T 34 N R 1 E	Garden	3
	Diversion 14.	0.8			NW¼ SE¼ S 30 T 34 N R 1 E	Garden	3
		2.1			NW¼ SE¼ S 30 T 34 N R 1 E	Meadow	3
		3.5		3.5			
	Earl Patton House Spr.Ditch. Diversion 16.	0.5			Lot 3 Sec 30 T 34 N R 1 E	Garden	3
		0.5		0.5			
				29.1	GRAND TOTAL		
Pehrson, A. F.	Pehrson-Grant-Strawn Ditch. Diversion 29. -- Borquist Ditch, Diversion 75. -- Big Spring, Diversion 76. -- Indian Spring, Diversion 77. -- Lake Spring, Diversion 78. -- and Reservoir Sp. Diversion 79.	(3.3			NW¼ NE¼ S 34 T 34 N R 1 W	Alfalfa	9
		2.2			NW¼ NE¼ S 34 T 34 N R 1 W	Grain	9
		0.6			NW¼ NE¼ S 34 T 34 N R 1 W	Potatoes	9
		0.2*			NW¼ NE¼ S 34 T 34 N R 1 W	Grain 1922	9
		0.2*			SE¼ SW¼ S 27 T 34 N R 1 W	Grain 1922	9
		A 1.6			SE¼ SW¼ S 27 T 34 N R 1 W	Grain	9
		4.0			NE¼ NW¼ S 34 T 34 N R 1 W	Alfalfa	9
		0.8			NE¼ NW¼ S 34 T 34 N R 1 W	Corn	9
		11.6			NE¼ NW¼ S 34 T 34 N R 1 W	Grain	9
		2.2			NE¼ NW¼ S 34 T 34 N R 1 W	Orchard	9
		1.6*			NE¼ NW¼ S 34 T 34 N R 1 W	Grain	9
			0.6		SW¼ SW¼ S 27 T 34 N R 1 W	Meadow	9
		0.3*			NE¼ NW¼ S 34 T 34 N R 1 W	Grain 1921	9
		10.5			SW¼ SW¼ S 27 T 34 N R 1 W	Meadow	9
		1.9			SW¼ SW¼ S 27 T 34 N R 1 W	Garden	9

(A) Irrigated by Diversion 29.
* Not irrigated in 1923 but irrigated subsequent to 1916.

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Pehrson, A. F. (cont.)	Pehrson-Grant-Strawn Ditch.	(B) 2.6			SE¼ SW¼ S 27 T 34 N R 1 W	Meadow	9
	Diversion 29. -- Borquist Ditch,	(B) 6.3			NE¼ SW¼ S 27 T 34 N R 1 W	Meadow	9
	Diversion 75. -- Big Spring,		0.9		SW¼ SW¼ S 27 T 34 N R 1 W	Pasture	9
	Diversion 76. -- Indian Spring,	(B) 1.3			NE¼ NW¼ S 34 T 34 N R 1 W	Orchard	9
	Diversion 77. -- Lake Spring,	(B) 0.3			SE¼ SW¼ S 27 T 34 N R 1 W	Orchard	9
	Diversion 78. -- and Reservoir Sp.	(B) 0.3			NW¼ NW¼ S 34 T 34 N R 1 W	Orchard	9
	Diversion 79.	(B) 0.3			NW¼ NW¼ S 34 T 34 N R 1 W	Potatoes	9
		(C) 0.2			SW¼ SW¼ S 27 T 34 N R 1 W	Potatoes	9
		0.6			NW¼ NW¼ S 34 T 34 N R 1 W	Potatoes	9
		1.5			NW¼ NW¼ S 34 T 34 N R 1 W	Garden & Orchard	9
		1.1			SW¼ SW¼ S 27 T 34 N R 1 W	Garden & Orchard	9
		0.2			NW¼ NW¼ S 34 T 34 N R 1 W	Garden	9
		0.6			SW¼ SW¼ S 27 T 34 N R 1 W	Meadow	9
		(D) 1.5			NE¼ SW¼ S 27 T 34 N R 1 W	Meadow	9
		1.9			NE¼ SW¼ S 27 T 34 N R 1 W	Corn	9
		2.0			SW¼ SW¼ S 27 T 34 N R 1 W	Meadow	9
		1.1			NW¼ SW¼ S 27 T 34 N R 1 W	Meadow	9
		62.8	1.5	64.3			
	Cedar Creek Ditch. Diversion 39.	0.6			NE¼ SE¼ S 22 T 34 N R 1 W	Garden 1922	7
		0.6		0.6			
				64.9	GRAND TOTAL		

(B) Irrigated by Diversions 29, 76, and 79.
(C) Irrigated by Diversions 29, 77, and 78.
(D) Irrigated by Diversions 75 (return water from Diversion 29).
* Not irrigated in 1923 but irrigated subsequent to 1916.

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Phillips, N. J.	Phillips Mill Ditch.	0.7			Lot 2 Sec 2 T 33 N R 1 W	Pasture	15
	Diversion 69.	0.1			Lot 3 Sec 2 T 33 N R 1 W	Garden	15
		0.8		0.8			
	Phillips Garden Ditch.	0.1			Lot 3 Sec 2 T 33 N R 1 W	Garden	15
	Diversion 70.	0.2			SE¼ NW¼ S 2 T 33 N R 1 W	Garden	15
		0.3		0.3			
				1.1	GRAND TOTAL		
Red River Lumber Company	Sam Rice Ditch Diversion 11.	3.0			Lot 1 Sec 30 T 34 N R 1 E	Meadow	3
		0.7			Lot 1 Sec 30 T 34 N R 1 E	Garden	3
		0.7			Lot 1 Sec 30 T 34 N R 1 E	Orchard	3
		0.4			Lot 1 Sec 30 T 34 N R 1 E	Corn	3
		0.2			Lot 1 Sec 30 T 34 N R 1 E	Grain	3
		0.3			Lot 1 Sec 30 T 34 N R 1 E	Pasture	3
		1.0*			Lot 1 Sec 30 T 34 N R 1 E	Meadow 1923	3
		3.1			Lot 4 Sec 19 T 34 N R 1 E	Meadow	3
		0.2			Lot 4 Sec 19 T 34 N R 1 E	Garden	3
		0.1			Lot 4 Sec 19 T 34 N R 1 E	Grain	3
		0.5			Lot 4 Sec 19 T 34 N R 1 E	Pasture	3
			0.6		Lot 1 Sec 30 T 34 N R 1 W	Meadow	3
		10.2	0.6	10.8			

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Red River Lumber Company (cont.d)	Cook & Butcher Ditch.	0.7			NE¼ SE¼ S 17 T 32 N R 3 W	Garden	27
	Diversion 110.	6.4*			NE¼ SE¼ S 17 T 32 N R 3 W	Garden 1921	27
		16.5*			NE¼ SE¼ S 17 T 32 N R 3 W	Garden 1921	27
		0.3*			NW¼ SW¼ S 16 T 32 N R 3 W	Garden 1921	27
		7.0			SE¼ SE¼ S 17 T 32 N R 3 W	Garden	27
		0.3*			SE¼ SE¼ S 17 T 32 N R 3 W	Garden 1921	27
		1.0			SE¼ SE¼ S 17 T 32 N R 3 W	Pasture	27
		0.8*			SE¼ SE¼ S 17 T 32 N R 3 W	Alfalfa 1921	27
		2.6*			NW¼ SE¼ S 17 T 32 N R 3 W	Garden 1921	27
		5.0*			NW¼ SE¼ S 17 T 32 N R 3 W	Alfalfa 1921	27
		1.6			SW¼ SE¼ S 17 T 32 N R 3 W	Pasture	27
		1.1			SW¼ SE¼ S 17 T 32 N R 3 W	Alfalfa	27
		21.8*			SW¼ SE¼ S 17 T 32 N R 3 W	Alfalfa 1921	27
		2.2			NW¼ NE¼ S 20 T 32 N R 3 W	Alfalfa	27
		4.9*			NW¼ NE¼ S 20 T 32 N R 3 W	Alfalfa	27
		19.1*			NW¼ NE¼ S 20 T 32 N R 3 W	Alfalfa 1921	27
		3.0*			NE¼ NE¼ S 20 T 32 N R 3 W	Alfalfa 1921	27
		94.3		94.3			
				105.1	GRAND TOTAL		
Rose, O. L.	Excelsior Ditch. Diversions 49 to 55, incl.	1.0			NE¼ SW¼ S 7 T 33 N R 1 E	Clover	13
		3.4			Lot 3 Sec 7 T 33 N R 1 E	Orchard	13

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Rose, O. L. (cont.)	Excelsior Ditch. Diversions 49 to 55, incl.	0.3			Lot 3 Sec 7 T 33 N R 1 E	Garden	13
		0.7			Lot 4 Sec 7 T 33 N R 1 W	Grain	13
		0.8			Lot 4 Sec 7 T 33 N R 1 E	Garden	13
		1.0*			Lot 4 Sec 7 T 33 N R 1 E	No Crop	13
		7.2		7.2	TOTAL AND GRAND TOTAL		
Ross, Wilford N. and Cox. John W.	Welch and Strayer Ditch System. Diversions 45, 46, 47, and 48.	3.5			Lot 2 Sec 30 T 33 N R 1 W	Meadow	21
		2.0			Lot 2 Sec 30 T 33 N R 1 W	Garden	21
		1.5			Lot 2 Sec 30 T 33 N R 1 W	Corn	21
		0.3			Lot 2 Sec 30 T 33 N R 1 W	Vineyard	21
		1.9			Lot 2 Sec 30 T 33 N R 1 W	Orchard	21
		4.8			Lot 2 Sec 30 T 33 N R 1 W	Pasture	21
		2.2*			Lot 2 Sec 30 T 33 N R 1 W	Meadow 1922	21
		15.8			Lot 3 Sec 30 T 33 N R 1 W	Meadow	21
		6.6			Lot 3 Sec 30 T 33 N R 1 W	Orchard	21
		0.2			Lot 3 Sec 30 T 33 N R 1 W	Vineyard	21
		0.6			Lot 3 Sec 30 T 33 N R 1 W	Garden	21
			0.6		Lot 3 Sec 30 T 33 N R 1 W	Meadow	21
			8.1		Lot 2 Sec 30 T 33 N R 1 W	Meadow	21
		39.4	8.7	48.1	TOTAL AND GRAND TOTAL		
Row, Fred	Row Ditch Diversion 33.	6.0			NE¼ NE¼ S 23 T 34 N R 1 W	Meadow	7
		0.6			NE¼ NE¼ S 23 T 34 N R 1 W	Orchard & Meadow	7
		0.5			NE¼ NE¼ S 23 T 34 N R 1 W	Vineyard	7
		7.1		7.1	TOTAL AND GRAND TOTAL		

*Not irrigated in 1923 but irrigated subsequent to 1916.

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crops	Map Sheet
Rutherford, Geo	Wilsey Ditch Diversion 106.	6.9			NE¼ SE¼ S 36 T 33 N R 3 W	Corn 1920	25
		6.9		6.9			
	Geo. Rutherford Slough Pump. Diversion 108.	2.5			NW¼ SE¼ S 36 T 33 N R 3 W	Garden	25
		0.4			NW¼ SE¼ S 36 T 33 N R 3 W	Alfalfa	25
		2.9		2.9			
				9.8	GRAND TOTAL		
Rutherford, John	John Rutherford Pump. Diversion 109.	2.0			Lot 4 Sec 2 T 32 N R 3 W	Garden	26
		1.6			Lot 4 Sec 2 T 32 N R 3 W	Alfalfa	26
		0.4*			Lot 4 Sec 2 T 32 N R 3 W	Garden 1922	26
		1.0			SW¼ NW¼ S 2 T 32 N R 3 W	Garden	26
		1.0			SW¼ NW¼ S 2 T 32 N R 3 W	Alfalfa	26
		0.4*			SW¼ NW¼ S 2 T 32 N R 3 W	Garden 1922	26
		0.3			Lot 1 Sec 3 T 32 N R 3 W	Alfalfa	26
		1.3*			Lot 1 Sec 3 T 32 N R 3 W	Garden 1922	26
		0.7			SE¼ NE¼ S 3 T 32 N R 3 W	Garden	26
		0.7			SE¼ NE¼ S 3 T 32 N R 3 W	Alfalfa	26
		1.6*			SE¼ NE¼ S 3 T 32 N R 3 W	Garden 1922	26
		5.9*			SE¼ NE¼ S 3 T 32 N R 3 W	Garden 1921	26
		1.9*			SE¼ NE¼ S 3 T 32 N R 3 W	Garden 1919	26
		18.8		18.8	TOTAL AND GRAND TOTAL		

* Not irrigated in 1923 but irrigated subsequent to 1916.

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Sharp, L. J.	Cook & Butcher Ditch.	3.3			SW¼ NW¼ S 29 T 32 N R 3 W	Alfalfa	28
	Diversion 110.	1.9			SW¼ NW¼ S 29 T 32 N R 3 W	Orchard & Grass	28
		2.4			SW¼ NW¼ S 29 T 32 N R 3 W	Sudan Grass	28
		0.6			SW¼ NW¼ S 29 T 32 N R 3 W	Garden	28
		8.2		8.2	TOTAL AND GRAND TOTAL		
Smith, E. L. & Frances	Smith Mountain Ditch.	0.6			SE¼ NW¼ S 29 T 34 N R 1 W	Alfalfa	11
	Diversion 42.	0.3			NE¼ SW¼ S 29 T 34 N R 1 W	Alfalfa	11
		2.6			SW¼ NW¼ S 29 T 34 N R 1 W	Alfalfa	11
		3.2			NW¼ SW¼ S 29 T 34 N R 1 W	Alfalfa	11
		1.0			NW¼ SW¼ S 29 T 34 N R 1 W	Orchard	11
		7.7		7.7			
	Smith Long Gulch Ditch and Smith Mountain Ditch Combined. Diversions 42 & 45.	0.9			NW¼ SW¼ S 29 T 34 N R 1 W	Sudan Grass	11
		3.1			NE¼ NE¼ S 31 T 34 N R 1 W	Corn	11
		6.6*			NE¼ NE¼ S 31 T 34 N R 1 W	No Data	11
		0.2*			SE¼ NE¼ S 31 T 34 N R 1 W	No Data	11
		10.8		10.8			
	Smith Spring Pipe line. Diversion 44.	0.4			NW¼ SW¼ S 29 T 34 N R 1 W	Grass	11
		0.4		0.4			
				18.9	GRAND TOTAL		
Stamford, P.W.R. Estate (Luella Lofton) (administratrix	Cook & Butcher Ditch.	1.2			NE¼ NW¼ S 20 T 32 N R 3 W	Alfalfa	27
	Diversion 110.	0.7			NE¼ NW¼ S 20 T 32 N R 3 W	Orchard	27
		0.9			NE¼ NW¼ S 20 T 32 N R 3 W	Meadow	27
		2.8		2.8	TOTAL AND GRAND TOTAL		

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont'd)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Strawn, A. H.	Pehrson-Grant-Strawn Ditch. Diversion 29.-- Maple Spring, Diversion 72.-- and Alder Spring Diversion 73.	1.3			SE¼ NE¼ S 34 T 34 N R 1 W	Orchard	9
		3.5			SE¼ NE¼ S 34 T 34 N R 1 W	Meadow	9
		3.6*			SE¼ NE¼ S 34 T 34 N R 1 W	Corn 1922	9
	(A)	4.2*			SE¼ NE¼ S 34 T 34 N R 1 W	Grain 1922	9
		0.4			SE¼ NE¼ S 34 T 34 N R 1 W	Clover	9
	(B)	0.5			SE¼ NE¼ S 34 T 34 N R 1 W	Orchard	9
		1.9*			NE¼ SE¼ S 34 T 34 N R 1 W	Corn 1922	9
	(A)	5.2			NE¼ SE¼ S 34 T 34 N R 1 W	Meadow	9
		3.4			NE¼ SE¼ S 34 T 34 N R 1 W	Meadow	9
		0.8			NE¼ SE¼ S 34 T 34 N R 1 W	Garden	9
		1.9			NW¼ SE¼ S 34 T 34 N R 1 W	Meadow	9
	(C)	1.2*			Lot 4 Sec 2 T 33 N R 1 W	Meadow 1922	15
		0.1			Lot 4 Sec 2 T 33 N R 1 W	Garden	15
		2.3			Lot 4 Sec 2 T 33 N R 1 W	Pasture	15
		0.6			SW¼ NW¼ S 2 T 33 N R 1 W	Garden	15
		0.7			SW¼ NW¼ S 2 T 33 N R 1 W	Pasture	15
			0.6		NE¼ SE¼ S 34 T 33 N R 1 W	Meadow	9
			0.2		Lot 4 Sec 2 T 33 N R 1 W	Pasture	15
		32.1	0.8	32.9	TOTAL AND GRAND TOTAL		
Thomas, Mrs. Emma E.	Excelsior Ditch. Diversions 49 to 55, incl.	5.6			NW¼ NE¼ S 13 T 33 N R 1 W	Meadow	13
		1.4			NW¼ NE¼ S 13 T 33 N R 1 W	Orchard	13

(A) Irrigated by Diversion 29.
(B) Irrigated by Diversions 29 and 72.
(C) Irrigated by Diversions 29 and 73.
*Not irrigated in 1923 but irrigated subsequent to 1916.

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Thomas, Mrs.E. (cont.d)	Excelsior Ditch Diversions 49 to 55, incl.	0.2			NW¼ NE¼ S 13 T 33 N R 1 W	Pasture	13
		0.5			NW¼ NE¼ S 13 T 33 N R 1 W	Wild Black berries	13
		1.1			NE¼ NW¼ S 13 T 33 N R 1 W	Pasture	14
		0.8			NE¼ NW¼ S 13 T 33 N R 1 W	Garden	14
		0.7			NE¼ NW¼ S 13 T 33 N R 1 W	Orchard	14
		1.3			NE¼ NW¼ S 13 T 33 N R 1 W	Wild Black berries	14
		6.9			NE¼ NW¼ S 13 T 33 N R 1 W	Meadow	14
		2.5			NE¼ NW¼ S 13 T 33 N R 1 W	Unseeded Pasture	14
		0.8			SE¼ NW¼ S 13 T 33 N R 1 W	Meadow	14
		1.4			SE¼ NW¼ S 13 T 33 N R 1 W	Unseeded Pasture	14
			1.4		NW¼ NE¼ S 13 T 33 N R 1 W	Meadow	13
			4.2		NE¼ NW¼ S 13 T 33 N R 1 W	Meadow	14
		23.2	5.6	28.8	TOTAL AND GRAND TOTAL		
Del Turner, E. C.Frisbee, and C.T.Dozier	John Kenyon Ditch; Diversion 24, and Dozier, Frisbee, Turner Reservoir Spring. Diversion 25.	0.1			SE¼ NW¼ S 31 T 34 N R 1 E	Garden	2
		0.5 ✓			NE¼ NW¼ S 31 T 34 N R 1 E	Orchard & Garden	2
		0.1 ✓			NE¼ NW¼ S 31 T 34 N R 1 E	Garden	2
		5.5 ✓			NE¼ NW¼ S 31 T 34 N R 1 E	Pasture	2
		0.3			NW¼ NW¼ S 31 T 34 N R 1 E	Pasture	2
		1.3			NW¼ NW¼ S 31 T 34 N R 1 E	Orchard & Garden	2
		0.2			NW¼ NW¼ S 31 T 34 N R 1 E	Garden	2
		0.6			NW¼ SE¼ S 31 T 34 N R 1 E	No Crop	2
		0.4			SW¼ NE¼ S 31 T 34 N R 1 E	No Crop	2
		9.0		9.0			

TABLE 11 (cont-d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-Irr	Total	Description	Crop	Map Sheet
Del Turner, E. C. Frisbee, and C.T.Dozier (cont.)	Dozier-Frisbee-Turner Garden Sp. Diversion 26.	0.7			SE¼ NW¼ S 31 T 34 N R 1 E	Grain	8
		0.3			SW¼ NE¼ S 31 T 34 N R 1 E	Garden	8
			0.1		SW¼ NW¼ S 31 T 34 N R 1 E	Pasture	8
		1.0	0.1	1.1			
				10.1	GRAND TOTAL		
Ward, R. A.	Scoggins Ditch. Diversion 99.	0.6 ✓			SE¼ SW¼ S 31 T 34 N R 1 W	Orchard	10
		2.6 ✓			SE¼ SW¼ S 31 T 34 N R 1 W	Meadow	10
		9.9 ✓			SE¼ SW¼ S 31 T 34 N R 1 W	Alfalfa	10
		0.1 ✓			SW¼ SE¼ S 31 T 34 N R 1 W	Alfalfa	10
		13.4		13.4			
	Scoggins Ditch. Diversion 99, and Ward Lower Ditch. Diversion 100.	0.5 ✓			Lot 4 Sec 6 T 33 N R 1 W	Garden	18
		0.2 ✓			Lot 3 Sec 6 T 33 N R 1 W	Meadow	18
		3.2 ✓			Lot 4 Sec 6 T 33 N R 1 W	Meadow	18
		10.3 ✓			SW¼ SW¼ S 31 T 34 N R 1 W	Meadow	18
		5.1 ✓			SW¼ SW¼ S 31 T 34 N R 1 W	Garden	18
		5.5 ✓			SW¼ SW¼ S 31 T 34 N R 1 W	Alfalfa	18
		0.4 ✓			SW¼ SW¼ S 31 T 34 N R 1 W	Sorghum	18
		2.2 ✓			Lot 4 Sec 31 T 31 N R 1 W	Sorghum	10
		0.3 ✓			Lot 4 Sec 31 T 34 N R 1 W	Grain	10
		1.3 ✓			Lot 4 Sec 31 T 34 N R 1 W	Alfalfa	10
		0.5 ✓			Lot 4 Sec 31 T 34 N R 1 W	Garden	10
		7.1 ✓			SW¼ SE¼ S 36 T 34 N R 1 W	Alfalfa	19

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Ward, R. A. (cont.)	Scoggins Ditch. Diversion 99, and Ward Lower Ditch. Diversion 100.	0.5 ✓			SE¼ SE¼ S 36 T 34 N R 2 W	Grain	19
		2.5 ✓			Lot 1 Sec 1 T 33 N R 2 W	Alfalfa	19
		0.9 ✓			Lot 1 Sec 1 T 33 N R 2 W	Meadow	19
		3.1 ✓			Lot 1 Sec 1 T 33 N R 2 W	Grain	19
		1.6			Lot 2 Sec 1 T 33 N R 2 W	Grain	19
		5.2			Lot 2 Sec 1 T 33 N R 2 W	Sudan Grass	19
			0.2 ✓		Lot 4 Sec 6 T 33 N R 1 W	Pasture	18
			0.2 ✓		Lot 4 Sec 31 T 34 N R 1 W	Meadow	18
			0.3 ✓		SW¼ SW¼ S 31 T 34 N R 1 W	Pasture	18
		48.4	0.7	49.1			
				62.6	GRAND TOTAL		
Webb, H. F.	Webb Ditch. Diversion 56.	1.2			Lot 1 Sec 18 T 33 N R 1 E	Meadow	13
		0.4			Lot 1 Sec 18 T 33 N R 1 E	Garden	13
		0.1			Lot 1 Sec 18 T 33 N R 1 E	Grass	13
		1.9			Lot 1 Sec 18 T 33 N R 1 E	Orchard	13
		1.3			Lot 1 Sec 18 T 33 N R 1 E	Orchard & Garden	13
		0.6*			Lot 1 Sec 18 T 33 N R 1 W	Garden 1922	13
		4.5*			Lot 1 Sec 18 T 33 N R 1 E	Pasture 1919	13
		10.0		10.0	TOTAL AND GRAND TOTAL		
Wilsey, Eliza	Wilsey Ditch. Diversion 106.	5.4 ~~5.4~~*			NE¼ SW¼ S 31 T 33 N R 2 W	No Crop	25
		2.7*			NE¼ SW¼ S 31 T 33 N R 2 W	Alfalfa 1920	25

* Not irrigated in 1923 but irrigated subsequent to 1916.

TABLE 11 (cont.d)

Name of Owner	Name of Ditch	Acreage Irrigated: Irr	Sub-irr	Total	Description	Crop	Map Sheet
Wilsey, Eliza (cont.)	Wilsey Ditch. Diversion 106.	1.7*			SE¼ SW¼ S 31 T 33 N R 2 W	No Crop	25
		5.1*			SE¼ SW¼ S 31 T 33 N R 2 W	Alfalfa 1920	25
		9.7*			Lot 4 Sec 31 T 33 N R 2 W	Alfalfa 1920	25
		0.5			Lot 4 Sec 31 T 33 N R 2 W	Alfalfa	25
		9.8			Lot 3 Sec 31 T 33 N R 2 W	Alfalfa	25
		2.0			Lot 3 Sec 31 T 33 N R 2 W	Garden	25
		0.8			Lot 3 Sec 31 T 33 N R 2 W	Orchard	25
		1.4			Lot 3 Sec 31 T 33 N R 2 W	Vineyard	25
		5.7*			Lot 3 Sec 31 T 33 N R 2 W	Corn 1922	25
		0.4*			Lot 3 Sec 31 T 33 N R 2 W	Alfalfa 1920	25
		45.2		45.2	TOTAL AND GRAND TOTAL		

TABLE 12

ESTIMATE OF MALCOLM DITCH DIVERSION FROM CEDAR CREEK

Date	Measured Flow in Second Feet	Mean Flow Second Feet	Days	Total Second Foot Days
June 20	0.6			
		0.90	17	15.3
July 6	1.2			
		0.85	4	3.4
July 10	0.5			
		0.60	7	3.5
July 17	0.5			
		0.55	5	2.8
July 22	0.6			
		0.85	7	6.0
July 29	1.1			
		0.95	6	5.1
Aug. 4	0.8			
		0.60	15	9.0
Aug. 19	0.6			
		0.65	5	3.2
Aug. 24	0.7			
		0.70	29	20.3
Sept.22	0.7			
Sept.22	Rains 1.2			
Total Days			95	
Gross Diversion Second Foot Days				85.6
Gross Diversion in Acre Feet				136

Discharges obtained by applying gage heights to rating curve.

TABLE 13

ESTIMATE OF REICH AND STRAYER DITCH DIVERSION FROM MILL CREEK

Date	Measured Flow In Second Feet	Mean Flow Second Feet	Days	Total Second Foot Days
June 12	3.4			
		3.40	5	17.0
June 16	3.4			
		3.45	10	34.5
June 26	3.5			
		3.20	12	38.4
July 8	2.9			
		2.70	4	10.8
July 12	2.5			
		2.45	14	34.3
July 26	2.4			
		2.40	2	4.8
July 28	2.4			
		2.30	22	50.6
Aug. 19	2.2			
		2.20	4	8.8
Aug. 23	2.2			
		2.20	7	15.4
Aug. 30	2.2			
		1.75	12	21.0
Sept. 11	1.3			
		1.30	1	1.3
Sept. 12	1.3			
Sept. 12	1.9			
		1.90	10	19.0
Sept. 22	Rains for season over			
Total Days			103	
Gross Diversion in Second Foot Days				255.9
Gross Run-off in Acre Feet				507

Discharges obtained by applying gage heights to rating curve.

TABLE 3A

ESTIMATE OF WEICH AND SHRAVER DITCH INPUT TO OAK RUN CREEK

Date	Measured Flow In Second Feet	Mean Second Feet	Days	Total Second Foot Days
June 12	1.6	1.60	2	3.2
June 13	1.6	1.50	6	9.0
June 19	1.4	1.45	7	10.2
June 26	1.5	1.45	12	17.4
July 8	1.4	1.30	4	5.2
July 12	1.2	1.20	5	6.0
July 17	1.2	1.20	5	6.0
July 22	1.2	1.20	4	4.8
July 26	1.2	1.10	24	36.4
Aug. 19	1.0	1.00	4	4.0
Aug. 23	1.0	0.90	7	6.3
Aug. 30	0.8	0.65	13	8.4
Sept. 12	0.5	0.50	10	5.0
Sept. 22	Season Over			
Oct. 13	0.5			
Total Days			103	
Gross Input in Second Foot Days				111.9
Gross Input in Acre Feet				221

Discharges obtained by applying gage heights to rating curve

TABLE 15

ESTIMATE OF LOSS IN THE WELCH AND STRAYER DITCH FROM MILL CREEK TO OAK RUN CREEK.

Date	Flow in Second Feet								
	Diverted from Mill Creek Q-1	Addition from Springs Q-2	At Lower Gage Q-3	800 ft. below lower Gage Q-4	Apparent loss as shown at lower gage Q1 + Q2 - Q3		Probable Actual Loss Q1 + Q2 - Q4	
					Second Feet	Percentage of flow Diverted	Second Feet	Percentage of flow Diverted
June 12	3.4	0.38	1.6	2.3	2.18	57	1.48	39
June 26	3.5	0.25	1.5	2.15	2.30	60	1.6	43
July 8	2.9	0.2	1.4	2.0	1.7	55	1.1	35
July 12	2.5	0.15	1.2	1.7	1.45	55	0.95	36
July 26	2.4	0.1	1.2	1.7	1.3	52	0.8	32
Aug. 19	2.2	0.1	1.0	1.45	1.3	56	0.85	37
Aug. 23	2.2	0.1	1.0	1.45	1.3	56	0.85	37
Aug. 30	2.2	0.1	0.8	1.15	1.5	65	1.15	50
Sept. 12	1.3	0.1	0.5	0.7	0.9	64	0.7	50
Sept. 22	Season over							
Totals	507	*30	221	316	316	59	221	41

* Figure arrived at by assuming flow of 0.27 c.f.s. June 12th - 26th, 0.23 c.f.s. June 26th - July 8th, 0.18 c.f.s. July 8th - 12th, 0.12 c.f.s. July 12th - 26th, and 0.10 c.f.s. July 26th to September 22nd.

The first column total is taken from Table 13, and the third column total is taken from Table 14.

TABLE 16

ESTIMATE OF EXCELSIOR DITCH FLOW AT ENTRANCE TO IRRIGATED LANDS

Date	Measured Flow in Second Feet	Mean Flow Second Feet	Days	Total Second Foot Days
June 13	3.0			
		3.60	2	7.2
June 14	4.2			
		3.30	5	16.5
June 19	2.4			
		2.50	23	57.5
July 12	2.6			
		2.60	5	13.0
July 17	2.6			
		2.50	9	22.5
July 26	2.4			
		2.15	28	60.2
Aug. 23	1.9			
		2.40	16	38.4
Sept.8	2.9			
		2.90	4	11.6
Sept.12	2.9			
		2.45	10	24.5
Sept.22	(Season over) 2.0 (Est)			
Total Days			102	
Gross Flow in Second Foot Days				251.4
Gross Run-off in Acre Feet				498

Discharges obtained by applying gage heights to rating curve.

TABLE 17

ESTIMATE OF WOODMAN DITCH DIVERSION FROM NORTH COW CREEK

Date	Measured Flow in Second Feet	Mean Flow Second Feet	Days	Total Second Foot Days
July 2	9.8			
		9.55	2	19.1
July 3	9.3			
		9.55	1	9.5
July 4	9.8			
		9.20	5	47.0
July 9	8.6			
		8.10	15	121.5
July 24	7.6			
		6.95	3	20.8
July 27	6.3			
		5.80	14	81.2
Aug. 10	5.3			
		6.00	4	24.0
Aug. 14	6.7			
		6.45	5	32.2
Aug. 19	6.2			
		5.10	4	20.4
Aug.23	4.0			
		4.05	2	8.1
Aug.25	4.1			
		4.40	9	39.6
Sept. 3	4.7			
		4.65	2	9.3
Sept. 5	4.6			
		3.95	5	19.8
Sept.10	3.3			
		3.25	4	13.0
Sept.14	3.2			
		3.20	7	22.4
Sept.21	3.2			
		3.20	1	3.2
Sept.22	(Season over)			
Total Days			83	
Gross Diversion in Second Foot Days				491.1
Gross Diversion in Acre Feet				974

Discharges obtained by applying gage heights to rating curve.

TABLE 18

ESTIMATE OF COOK AND BUTCHER DITCH DIVERSION FROM NORTH COW CREEK

Date	Measured Flow In Second Feet	Mean Flow Second Feet	Days	Total Second Foot Days
June 14	7.2	6.30	19	119.7
July 2	5.4	6.25	2	12.5
July 4	7.1	5.75	9	51.8
July 13	4.4	5.45	4	21.8
July 17	6.5	5.00	9	45.0
July 26	3.5	4.75	1	4.8
July 27	6.0	5.20	6	31.2
Aug. 2	4.4	3.70	7	25.9
Aug. 9	3.0	2.60	1	2.6
Aug. 10	2.2	2.35	1	2.4
Aug. 11	2.5	2.85	14	39.9
Aug. 25	3.2	2.85	9	25.6
Sept. 3	2.5	1.25	1	1.2
Sept. 4	0	0	1	0
Sept. 5	0	0	1	0
Sept. 6	0			
Sept. 7	Trace	1.40	16	22.4
Sept. 8	Stock use only			
Sept. 22	(Season over) *2.8			
Total Days			101	
Gross Diversion Second Foot Days				406.8
Gross Diversion in Acre Feet				806

*Interpolated from flow on Sept. 6, and on Oct. 2, which was 4.5 c.f.s. Discharge determined by applying gage heights to rating curve.

TABLE 19

SUMMARY OF DIVERSION SYSTEMS DIVERTING FROM NORTH COW CREEK AND ITS TRIBUTARIES.

Name of Diversion System	Diversion Number	Stream Diverted From	Acreage Irrigated	Acreage Sub-irrigated	Total acreage i: and sub-irrigat
Afterthought Mine Pump	104	North Cow Creek	0.0	0.0	0.0
Afterthought Mine Pump	105	North Cow Creek	0.0	0.0	0.0
Angle Spring Ditch	67	Spring	0.2	0.0	0.2
Asher House Pipe Line	103	Spring	0.0	0.0	0.0
Bibbens Ditch	89	North Cow Creek	19.6	3.8	23.4
Benbow Ditch *	12	North Cow Creek	0.0	0.0	0.0
Bishop Ditch	4	Cedar Creek	6.4	0.0	6.4
Bishop Spring Ditch	5) 6)	Spring	2.7	0.0	2.7
Bogue Pump Ditch	115	North Cow Creek	11.1	0.0	11.1
Boyle Pump Ditch	114	North Cow Creek	12.2	0.0	12.2
Butzbach Pump Ditch	116	North Cow Creek	15.5	0.0	15.5
Borquist Ditch	75	Pehrson-Grant-Strawn Ditch return water	0.0	0.0	0.0
Cook and Butcher Ditch	110	North Cow Creek	208.1	0.0	208.1
Dozier-Frisbee-Turner Reservoir Spring	25	Spring (included under acreage of John Kenyon Ditch	0.0	0.0	0.0
Dozier-Frisbee-Turner Garden Sp.	26	Spring	1.0	0.1	1.1

*Note:- Acreage included under McCandless Ditch Diversion 34, and Johnson-Haley Diversion 31.

TABLE 19 (cont.d)

Name of Diversion System	Diversion Number	Stream Diverted From	Acreage Irrigated	Acreage Sub-irrigated	Total acreage irr. and sub-irrigated
Dungan Gulch Upper Ditch	81	Dungan Gulch	5.2	0.0	5.2
Dungan House Pipe Line	82	Dungan Gulch	0.3	0.0	0.3
Dungan Gulch Main Ditch	83	Dungan Gulch	20.2	4.0	24.2
Dungan Upper Unnamed Wash	84	Unnamed Wash	2.9	0.0	2.9
Dungan Middle Unnamed Wash	85	Unnamed Wash	0.9	0.0	0.9
Dungan Lower Unnamed Wash	86	Unnamed Wash	0.9	0.0	0.9
Dungan Little Valley Sp. Ditch	87	Spring	1.9	0.0	1.9
Eldridge Upper Ditch	88	North Cow Creek	54.5	0.0	54.5
Eldridge Lower Ditch	90	North Cow Creek	22.9	0.0	22.9
Eldridge Island Ditch	91	North Cow Creek	1.7	0.0	1.7
Eldridge House Ditch	92	North Cow Creek	1.0	0.0	1.0
Ellerkamp Ditch	28	North Cow Creek	1.5	0.0	1.5
Erickson Ditch	7-8-9	Cedar Creek	24.0	0.0	24.0
Excelsior Ditch	49-50)) 51-55 inc)	Mill Creek and So. Fork of Mill Creek Springs	56.7	7.8	64.5

TABLE 19 (cont.d)

Name of Diversion System	Diversion Number	Stream Diverted From	Acreage Irrigated	Acreage Sub-irrigated	Total acreage irr. and sub-irrigated
Erickson Spring Pipe Line	10	Spring	1.1	0.0	1.1
Frisbee House Spring	27	Spring	0.0	0.0	0.0
Grant Spring Ditch	74	Spring	0.3	0.0	0.3
Gray Ditch	111	North Cow Creek	14.7	0.0	14.7
Gray Upper Pump	112	North Cow Creek	5.0	0.0	5.0
Gray Lower Pump	113	North Cow Creek	2.4	0.0	2.4
Halcumb Ditch	32	Cedar Creek	66.9	3.0	69.9
Hadley Upper Ditch	40	Cedar Creek	17.0	0.0	17.0
Hadley Lower Ditch	41	Cedar Creek	3.8	0.0	3.8
Hawes Upper Spreading Dam	59	Spring Channel	0.6	0.0	0.6
Hawes Lower Spreading Dam	61	Rose return water channel	1.1	0.0	1.1
Hawes Orchard Ditch	57-58	Mill Creek (seepage)	1.6	0.0	1.6
Hawes Garden Ditch	60	Rose return water channel	1.2	0.0	1.2
Hawes Short Garden Ditch	62	Rose return water channel	0.2	0.0	0.2
Hawes North Garden Ditch	66	Rose return water channel	0.3	0.0	0.3

TABLE 19 (cont.d)

Name of Diversion System	Diversion Number	Stream Diverted From	Acreage Irrigated	Acreage Sub-irrigated	Total acreage irr. and sub-irrigated
Hawes South Garden Ditch	85	Rose return water channel	0.5	0.0	0.5
Hobson House Pipe Line	97	Spring	0.0	0.0	0.0
Hobson Upper Ditch	93	North Cow Creek	10.7	0.0	10.7
Hobson Lower Ditch	94	North Cow Creek	42.8	0.4	43.2
Hobson Orchard Springs	95-96	Springs	0.7	0.0	0.7
Hoffman Ditch	102	North Cow Creek	14.6	0.0	14.6
Johnson-Haley Ditch	31	Cedar Creek	59.8	3.5	63.3
Johnson Waste Water Ditch	33	Haley Waste Water	2.4	1.3	3.7
John Kenyon Ditch	24	Middle Fork North Cow Creek	9.0	0.0	9.0
F.H.Kenyon Ditch	17-18-19	Unnamed tributary to Middle Fork North Cow Creek	22.2	0.0	22.2
F.H.Kenyon Upper Spring Ditch	20	Unnamed spring channel	2.7	0.2	2.9
F.H.Kenyon Middle Spring Ditch	21	Unnamed spring channel	2.3	0.1	2.4
F.H. Kenyon Lower Spring Ditch	22	Unnamed spring channel	0.4	0.0	0.4
McCandless Ditch	34	Cedar Creek	10.8	0.0	10.8
McCandless Waste Water Ditch	36	Haley Waste Water Channel	17.7	0.1	17.8
McCandless Upper Spring Ditch	37	Spring	11.8	0.4	12.2

TABLE 19 (cont.d)

Name of Diversion System	Diversion Number	Stream Diverted From	Acreage Irrigated	Acreage Sub-irrigated	Total acreage irr. and sub-irrigated
McCandless Lower Spring Ditch	38	Spring	2.8	0.7	3.5
Maxwell Waste Water	68	(Included under Excelsior Ditch)	0.0	0.0	0.0
A. S. Patton South Ditch	1	Tolidy Springs Channel	52.6	2.0	54.6
A.S. Patton North Ditch	2-3	Unnamed spring	33.9	2.1	36.0
Earl Patton Ditch	13-15	North Fork North Cow Cr. and Spring Channel	25.0	0.1	25.1
Earl Patton Spring Ditch	14	Spring Channel	3.5	0.0	3.5
Earl Patton House Spring Ditch	16	Spring	0.5	0.0	0.5
Pehrson Big Spring Ditch	76)				
Pehrson Indian Spring Ditch	77)	Springs (included in Pehrson-Grant-Strawn Ditch)	0.0	0.0	0.0
Pehrson Lake Spring Ditch	78)				
Pehrson Reservoir Spring Ditch	79)				
Pehrson Cedar Creek Ditch	39	Cedar Creek	0.6	0.0	0.6
Pehrson House Spring Ditch	80	Spring (incl. in Pehrson-Grant-Strawn Ditch)	0.0	0.0	0.0
Pehrson-Grant-Strawn Ditch	29	North Cow Creek	127.2	3.8	131.0
Phillips Waste Ditch	71	Unnamed Wash	0.0	0.0	0.0
Phillips Garden Ditch	70	North Cow Creek	0.3	0.0	0.3
Phillips Mill Ditch	69	North Cow Creek	0.8	0.0	0.8

TABLE 19 (cont.d)

Name of Diversion System	Diversion Number	Stream Diverted From	Acreage Irrigated	Acreage Sub-irrigated	Total acreage irr. and sub-irrigated
Row Ditch	33	Cedar Creek	7.1	0.0	7.1
G.Rutherford Slough Pump	108	Slough	2.9	0.0	2.9
John Rutherford Pump	109	North Cow Creek	18.8	0.0	18.8
Sam Rice Ditch	11	North Fork North Cow Creek	20.2	0.6	20.8
Rose Return Water Ditch (J.C. Hawes, owner)	63-64	Rose Return Water Channel and Mill Creek	0.0	0.0	0.0
Red River Lumber Co. Flume	101	Included in Cook and Butcher Ditch Diversion 110	0.0	0.0	0.0
Scoggins Ditch	99	North Cow Creek	13.4	0.0	13.4
Smith Mountain Ditch	42	Cedar Creek	7.7	0.0	7.7
Smith Spring Pipe Line	44	Spring	0.4	0.0	0.4
Smith Long Gulch Ditch	45	Long Gulch and Cedar Creek	10.8	0.0	10.8
Strawn Maple Spring Ditch	72	Spring (incl. in Pehrson-Grant-Strawn Ditch)	0.0	0.0	0.0
Strawn Alder Spring Ditch	73	Spring	0.0	0.0	0.0
Unnamed spring channel	23	Spring Channel (incl. in F.H. Kenyon Ditch)	0.0	0.0	0.0
Ward Lower Ditch	100	North Cow Creek	48.4	0.7	49.1
Webb Ditch	56	Spring Channel and Mill Cr.	10.0	0.0	10.0

TABLE 19 (cont'd)

Name of Diversion System	Diversion Number	Stream Diverted From	Acreage Irrigated	Acreage Sub-irrigated	Total acreage irr. and sub-irrigated
Wilsey Ditch	106	North Cow Creek	52.1	0.0	52.1
Ward House Pipe Line	98	Spring	0.0	0.0	0.0
Welch and Strayer Ditch System	45) 46-47-48)	Mill Creek Springs	118.2	11.8	130.0
Woodman Ditch	107	North Cow Creek	107.2	0.0	107.2
Sub-irrigated (no ditch)	38	Haley-Johnson Waste Water Channel	0.0	7.3	7.3
		TOTALS	1460.4	53.8	1514.2